

JUNE

25 CENTS

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN

REGD. TRADE MARK, GREAT BRITAIN, NO. 410426

REG. U. S. PAT. OFF.

SEE PAGE 953

IT
CAN STILL
BE DONE—
Frazier Hunt





Announcing

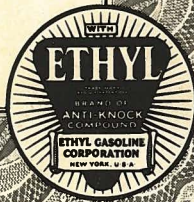
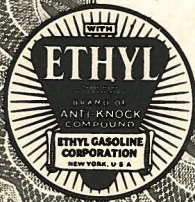
a new and higher standard

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THE anti-knock standard and all-round quality of Ethyl have been raised still higher. For two reasons: (1) to give you more for your money, (2) to meet the requirements of automobiles the motor industry has brought out to take full advantage of Ethyl's universal distribution. Q The new cars with high compression engines require fuel of Ethyl's anti-knock standard, and in turn give more power from every gallon. Older cars find Ethyl a real economy because it prevents harmful knock, overheating and power-loss. Q The new standard widens still further Ethyl's margin of superiority over ordinary gasoline. Though it costs oil companies more to produce this higher quality, the price of Ethyl today is less, on the average, than you paid for regular gasoline only a few years ago.

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Ethyl fluid contains lead



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ROLL-O-MATIC—The Automatic Home Cigarette Factory. Not a toy, not a pocket device. Size 5" x 5" x 3". All metal construction, with handsome, baked-on satin finish. Precision made—rollers, gears, etc., of solid brass, nicked. Absolutely guaranteed for one year.



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Papers Included**

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AGENTS The Most Sensational! Money-Maker in Years!

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Just think. In all states you pay a tax of at least 6c per package for ready-made cigarettes. This way you "roll your own" with a blend of the same fine Turkish and domestic tobaccos that go into ready-mades—and out of every three cigarettes you smoke, two are practically free.

A BILLION DOLLAR MARKET

Millions of smokers already turning "penny-wise"—everyone a prospect. Watch sales and profits

skyrocket with one-minute demonstration that shows how anyone can now have perfect cigarettes for only 5c a package. Low price and liberal commission plan make **ROLL-O-MATIC** the most amazing "natural" seller ever. Even women enthusiastic, for papers can be supplied in any shade, with gold tips if desired. Complete outfit for monogramming offered. Mail coupon at once for free demonstration offer and full details of how you can earn \$20,

\$30 a day and up with this astounding little machine. Act **TODAY** while exclusive territories are still open. **Marden Mfg. Co., 601 Main Street N.E., Minneapolis, Minn.** Manufacturers of automatic machinery.

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Place a ready-made and a **ROLL-O-MATIC** cigarette side by side. They are equally firm, full and rounded—look alike, taste alike and draw alike—**same as twins!** And think of the saving.

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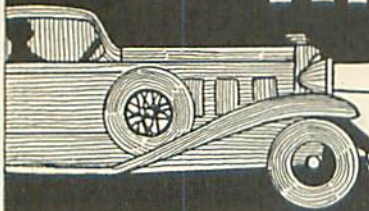
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DOUBLES LIGHT *on road* for Auto NIGHT DRIVING



Z-RAY Invention GIVES SAFER, BRIGHTER LIGHT

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Z-RAY COMPANY

650H Balcony Bldg. KANSAS CITY, MO.



Laboratory Test

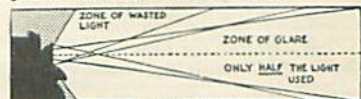
Says: (1) Zone of Glare Decreased 39.3%

(2) Searchlight Zone Light Increased 242.8%

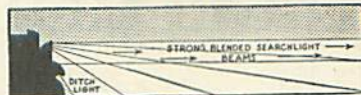
(3) Flood-light Zone Light Increased 715.7%

SCIENTIFICALLY CORRECT

The above test made with Macbeth Illuminometer (a scientific instrument for measuring light intensity) using Ford headlights with 32 candle power bulbs without Z-Rays and then with Z-Rays attached.



The OLD WAY (above)



The Z-RAY WAY (above)

Z-RAY COMPANY,
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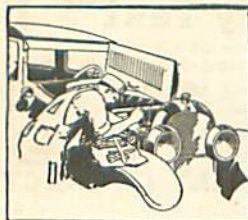
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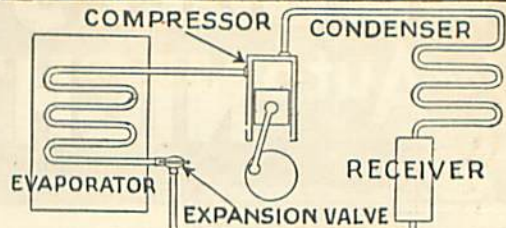
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The fact is—we know many LaSalle members who have been actually promoted—given higher pay during the last two years. They are "sitting on top of the world"—not only sure of their jobs but ready for rapid progress—out in front of the crowd when prosperity smiles again—and it will.

Here are just a few of these "cases"—in their own words.*

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Naturally, to illustrate our other point—that men who train in depression have a decided advantage when

prosperity returns—we must go back to the hard times of 1920-1921. We have plenty of cases there—but space permits only these two.*

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Another man, hard hit by the post-war depression, saw the opportunity in hard times and became a LaSalle member. With the return of prosperity, promotions rewarded his increased ability until he became Treasurer of a large and famous department store at a salary more than 300% greater.

But why mention case after case when, after all, what is most important to you is whether you can take advantage of the depression.

It all depends on the kind of a man you are. Most men are waiting for the return of prosperity.

Such men will be little better off in good times. Prosperity will choose the men who have taken the depression as a stepping stone to leadership—as a time to prepare themselves for greater responsibilities.

If you are in this latter class, find out what training can do for you. We will gladly take the responsibility of showing how LaSalle training can—if you will do your part—raise your pay and push you up. We will gladly explain our many-fold service which guides your every step toward success.

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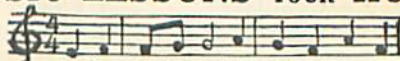
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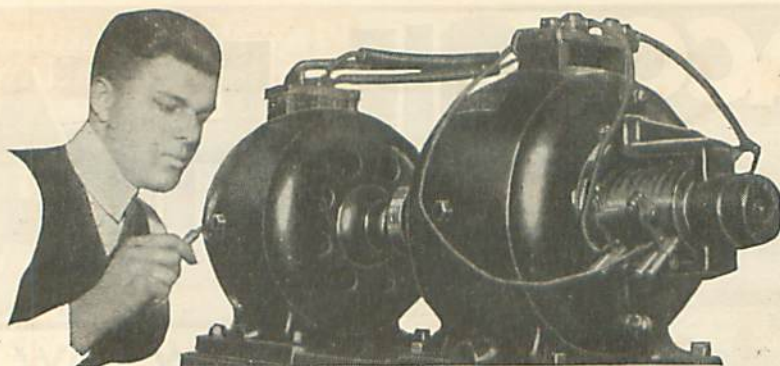
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I could scarcely believe it, and I showed my teacher the ad.

"You'll never learn," she cried. "You'll only waste your money. No one can learn to play that way."

But I was desperate and I decided to investigate the course. When the free demonstration lesson came, I saw at once that my teacher had been wrong, for here, at last, was a method of learning to play right in your own home—with no outside aid—and in less than half the usual time. I sent for the course at once.

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I could now play most popular music, as well as some classical pieces.

She laughed. "You'll have to prove that to me, Bill."

"All right," I said, as I walked over to the piano.

"What does Bill think he's going to do?" someone asked.

"It's just his little joke," laughed my teacher. "He's making believe he can play."

"That's right," I said. "It's a joke—and a good one."

Right then I swung into the haunting refrain of "Time on My Hands." I knew that they were waiting—ready to jeer. Then I sensed a change. They were listening, really listening with enjoyment and surprise. At the end of the piece I turned smiling and faced them.

"Why, Bill!" my teacher exclaimed, "how did you ever do it? A few months ago you could scarcely read music."

They all fired questions at me. How had I learned in such a short time? Where had I studied? How had I found a teacher? But I kept my secret to myself. In a few minutes they were all begging me to play for dancing.

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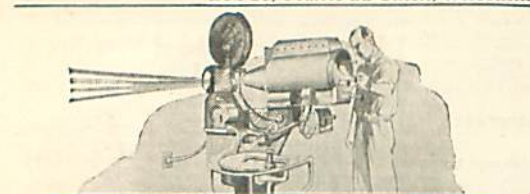
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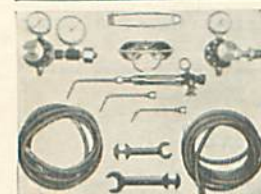
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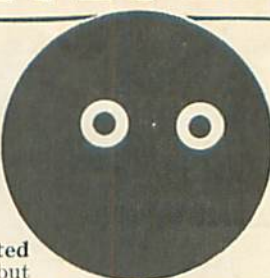
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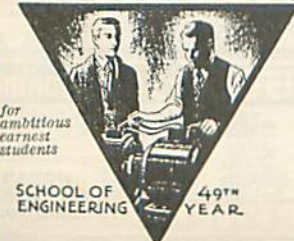


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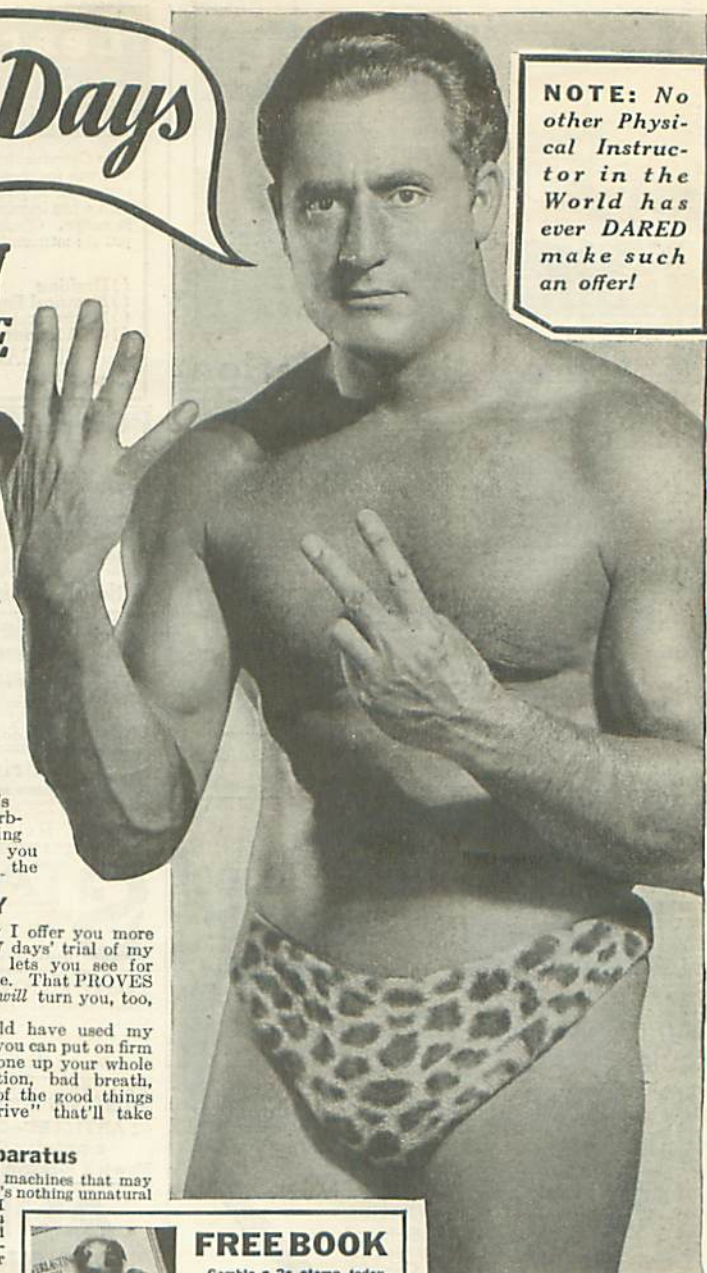
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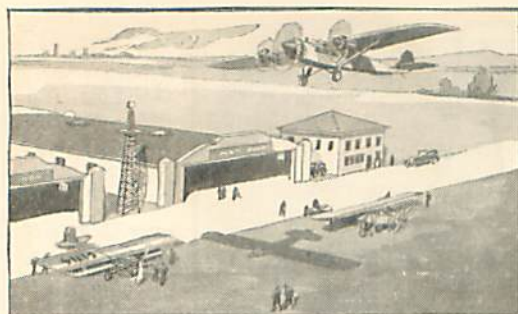
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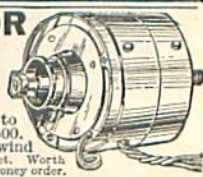
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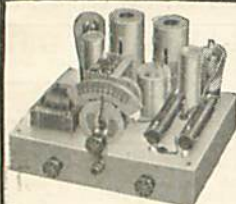
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MAKE Latest guaranteed automobile necessities, newest cars, latest toilet specialties, medical preparations, meritorious household necessities. Using Miller's foremost formulas and trade secrets. Easy to start anywhere. Investment small, profits quick and liberal. Miller, Chemist, 706-L, Tampa, Fla.

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1,000,000 FORMULAS, Industrial facts, tables, processes, rules, trade secrets, and calculations for all kinds of Trades and Businesses. Book—Moore's Assistant—1316 pages. Sent postpaid for \$2.00. Ogilvie Publishing Co., 57 Rose St., Dept. 22, New York.

TEN Real, money-making formulas for one dollar. Cash or money order. Patrick Henry, Brighton, Iowa.

BIG Profits! Big demand! "Easy to make." Send me \$5 and I will show you how to make a non-poisonous spray that kills flies, mosquitoes and all kinds of insects. Your money back if it don't kill. J. N. O'Rear, Attalla, Ala.

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75,000 PROFIT Making formulas. Following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, mudclays, bleaching, renovating, coloring metals, dyeing glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Just write for "Scientific American Encyclopedia of Formulas." When postman hands you book pay \$5.50 and postal charges. Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago, Ill.

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SELL Housewives cedarized, mothproof garment bags, for 35c. Cost \$1.75 dozen pre-paid. Sample 25c. Wartell, Dept. M, 529 S. Franklin, Chicago.

SELL Raincoats for men, women, children; \$3.95; big weekly income. Outfit free. Goodyear Rainwear Co., 18 West 22nd St., New York City.

FAST Mail seller—Free sample. Plans, Circulars furnished. Seewagon, 2328 West Pico, Los Angeles, Calif.

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MAIL Order News (established 30 years) tells how to start mail order business. Descriptive details free. George E. Cassidy, 509 Fifth Ave., New York.

BIG Money steady. High grade coveralls, shopcoats, pants, shirts. Advertising on back. Fast sellers. Great demand. Prospects everywhere. Free outfit. Strong Mfg. Company, 911 West Jackson, Chicago.

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MOST Sensational moth pad deals! Largest, strongest 25c pad ever made—six dozen \$3.00, your profit \$1.00—Hurry! Rhodes Co., E-2550 North Ashland, Chicago.

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400% PROFIT Selling signs used everywhere. Largest selection, wonderful repeat business. \$1.00 worth samples, 25c 50 signs \$3.00; 100 signs, \$5.00. P. Franklin Co., 3322 Third Ave., New York.

SPECIALTY Salesmen preferred. Organize territory. Selling Nu-Way safety razor blade holders and sharpeners, wholesale or retail. Send 25c cash for sample and information. Atlas Mfg. Company, 225 Mfrs. Exchange Bldg., Kansas City, Mo.

FLAVORING Extract sensation. \$1 vanilla, \$1 lemon, 50c almond, 60c maple, \$3.20 every 100 in attractive sample case 90c. Your profit 50c. Every home uses. Sales easy. Crema Folks, St. Paul, Minn.

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AGENTS: New insecticide spray for garden and shrubbery. Screws on garden hose in place of nozzle. Steady income from furnishing insecticide charges to sprays you have sold. Write for territory. No competition. The Morley & Neilson Mfg. Co., Delta, Ohio.

\$300,000.00 HAS Been made in the last ten months by agents selling the Four-Bottle Extract. Sensation. \$5.20 value—sells for \$1.00—costs you 38¢. Write today to Jack Foster, President, American Chemical Company, 1945 St. Anthony Ave., St. Paul, Minnesota, Dept. G.

BIG Profit catalog. Toilet preparations, food products, remedies, household specialties, moth exterminators, portraits, frames, medallions, photophiles, religious goods. Catalog. James Halsey Company, 606L Blue Island Ave., Chicago.

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300% PROFIT in the Everlasting Match. No dirt or friction. What makes it light? No wind can blow it out. Retails 50c. Sample and sales plan 25c. New Method Co., Desk PM-6, Bradford, Pa.

ELECTRIC Water heater—New. Heats water instantly. Pocket size—retails \$3.75. Two minute demonstration makes you \$1.95 profit. Lux-Viel, Dept. 67, Elkhart, Ind.

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CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 10.

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RAZOR Blades, hollow ground, improved double edge, ten cent packages, carded, easy selling. Sold everywhere. Standard Safety Razor, Pittsburgh, Penna.

AMAZING New discovery making big money for distributors. No competition. Territory going fast. X-L Chemical Laboratory, Elkhart, Indiana.

NEW Curtain rod starters. Retails 10c. Big profit. Free sample with particulars. Koehler Mfg. Co., 110 Burkhardt Ave., Dayton, Ohio.

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100% PURE Silk men's neckwear \$2.70 doz., others at \$1.25 and \$1.65 doz. Send 25¢ with order, balance cash. Money refunded if dissatisfied. Fifth Avenue Textile, 859C Troy Avenue, Brooklyn, New York.

400% BEST 25c Article on market. It's new and demanded. Every housekeeper buys one on sight. L. P. Okerstrom, 435 East 108th Street, Los Angeles, California.

SELL Cosmetics under your own name. 500% profit. Sell by mail or agents. Advertising copy, sales helps free. F. A. Gordan, 4951 S. Ashland, Chicago.

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AT Last, scratch eraser that heals scratches on finest furniture. Rub lightly—scratches disappear. Sells on demonstration. 100% profit. Agents being appointed. Write, Freemans, 696 So. Broadway, Denver, Colo.

GENUINE Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

GUARANTEED "Run-Proof" hosiery. Men's latest fancy hose—doz. \$1.25-\$1.90; ladies', fashioned hosiery—doz. \$1.90-\$2.90. Catalog free. Superior Hosiery Company, Dept. 34, New Haven, Conn.

NEW Changeable sign sells to stores for \$1.00, agent's profit 300%. Particulars free. National Sign System, St. Louis, Mo.

NEW Discovery. Washes clothes without rubbing. Whirlwind seller. Great repeater. Splendid profit. Sample free. Besco, 4315P Irving Park, Chicago.

MAKE-Sell these guaranteed, specialty-necessities: Plastic wood; evergreen insect spray; chlorox; handy solder; Silco water paint; ice-saving blankets; Pure moth tablet; Magic dish wash; Water-Wax floor polish; Plastex-Compeltol-liquid marble; using Miller's foremost formulas. Easy to start anywhere. Investment small, profits, immediate and great. Dr. Lescom Miller, Chemist, Tampa, Fla.

MIRRORS Resilvered at home. Costs near 5 cents per square foot; you charge 75 cents. Profitable business plating on mirrors, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details free. Write, Sprinkle, Plater, 128, Marion, Ind.

MARVELOUS Chemical cloth, cleans, polishes all metals instantly without liquid, paste, powder; record-breaking seller to housewives, stores; 300% profit; sample free. Shef. D. Mfg. Co., Union City, N. J.

MAKE-Sell your own products. Formula catalog free. "Kemico," BW, Parkridge, Illinois.

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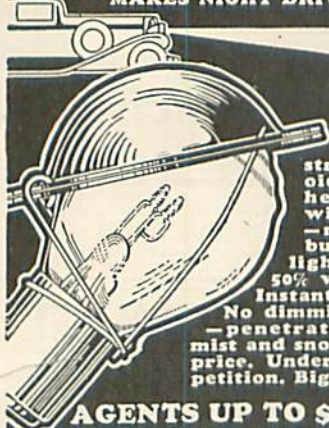
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC. REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of Popular Mechanics Magazine, published monthly at Chicago, Ill., for April 1, 1932.

State of Illinois, County of Cook, ss.
Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, Jr., who, being duly sworn, deposes and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit: First, That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. K. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, W. C. Kueker, 200 East Ontario St., Chicago, Ill. Second, That the owner is (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent. or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual owner, must be given. The Popular Mechanics Company, 200 East Ontario St., Chicago, Ill. L. B. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Third, That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth, That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affirmations and beliefs as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of bona fide owners; and this affiant has no reason to believe that any other persons, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. H. H. WINDSOR, Jr., Editor and Publisher, sworn to and subscribed before me this 31st day of March, 1932. J. GRAHAM, Notary Public. (My commission expires June 16, 1932.)

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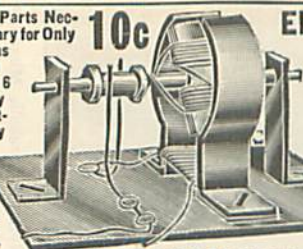
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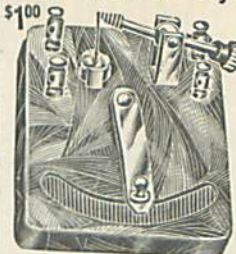
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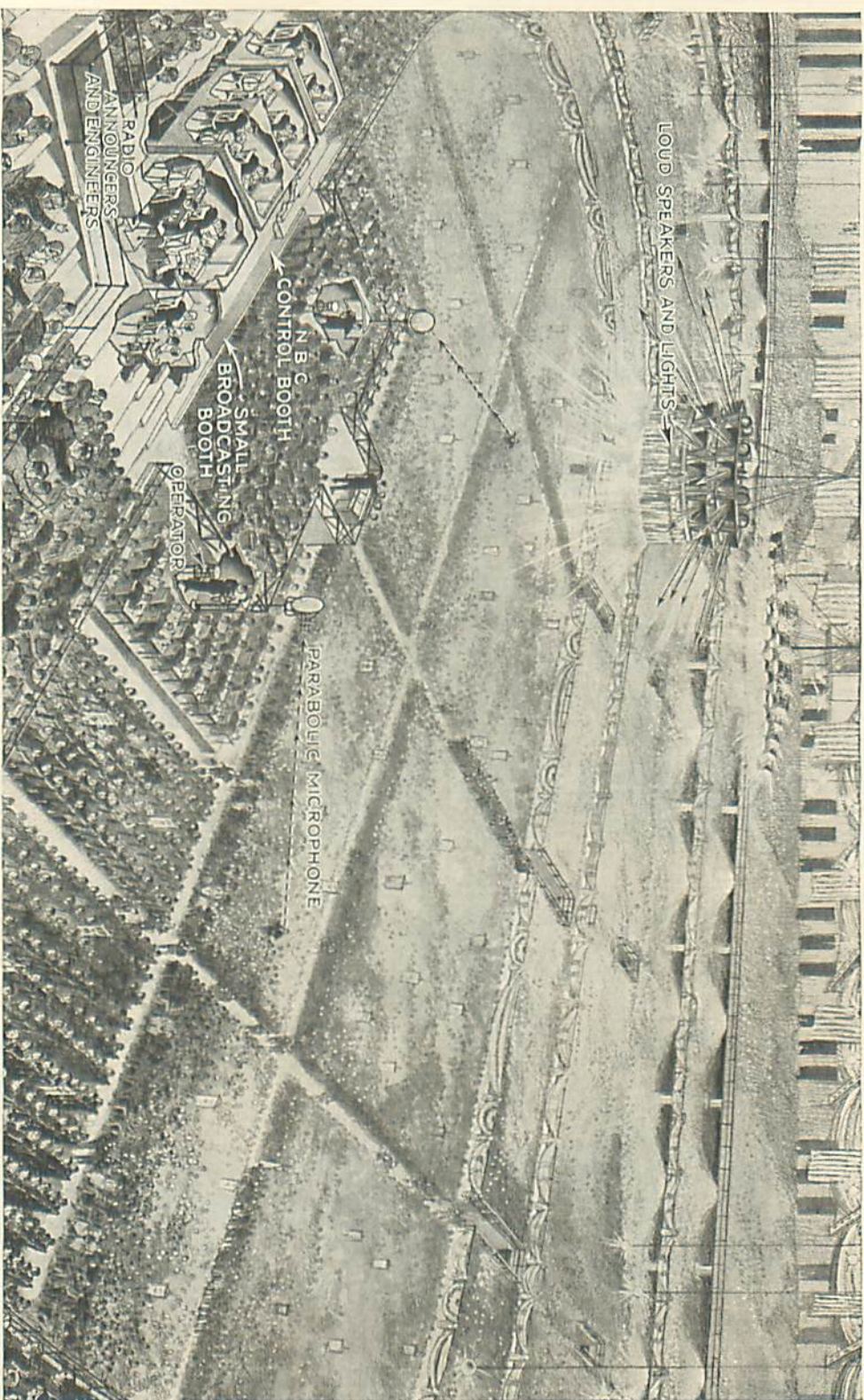
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Interior of the Chicago Stadium, Showing How Proceedings of the National Political Conventions Are to Be Broadcast throughout the World; Note the Parabolic Microphones to Pick Up Remarks from the Floor, and the Radio Booths Back of the Platform

Popular Mechanics Magazine

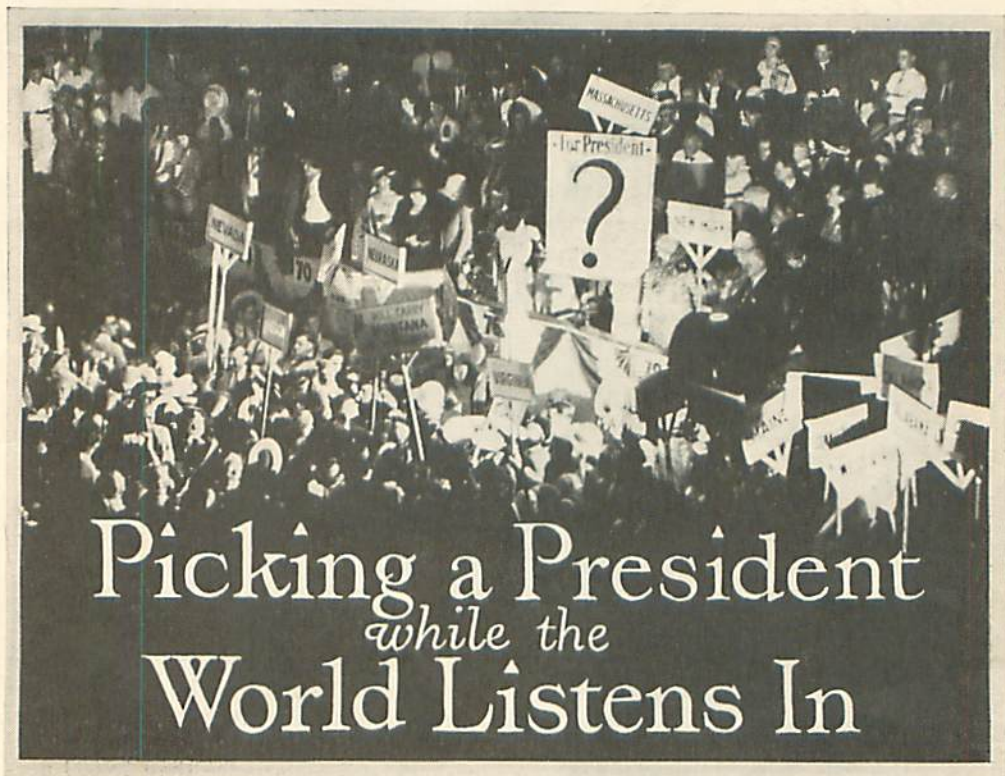
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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 57

JUNE, 1932

No. 6



Picking a President *while the* World Listens In

By H. W. MAGEE

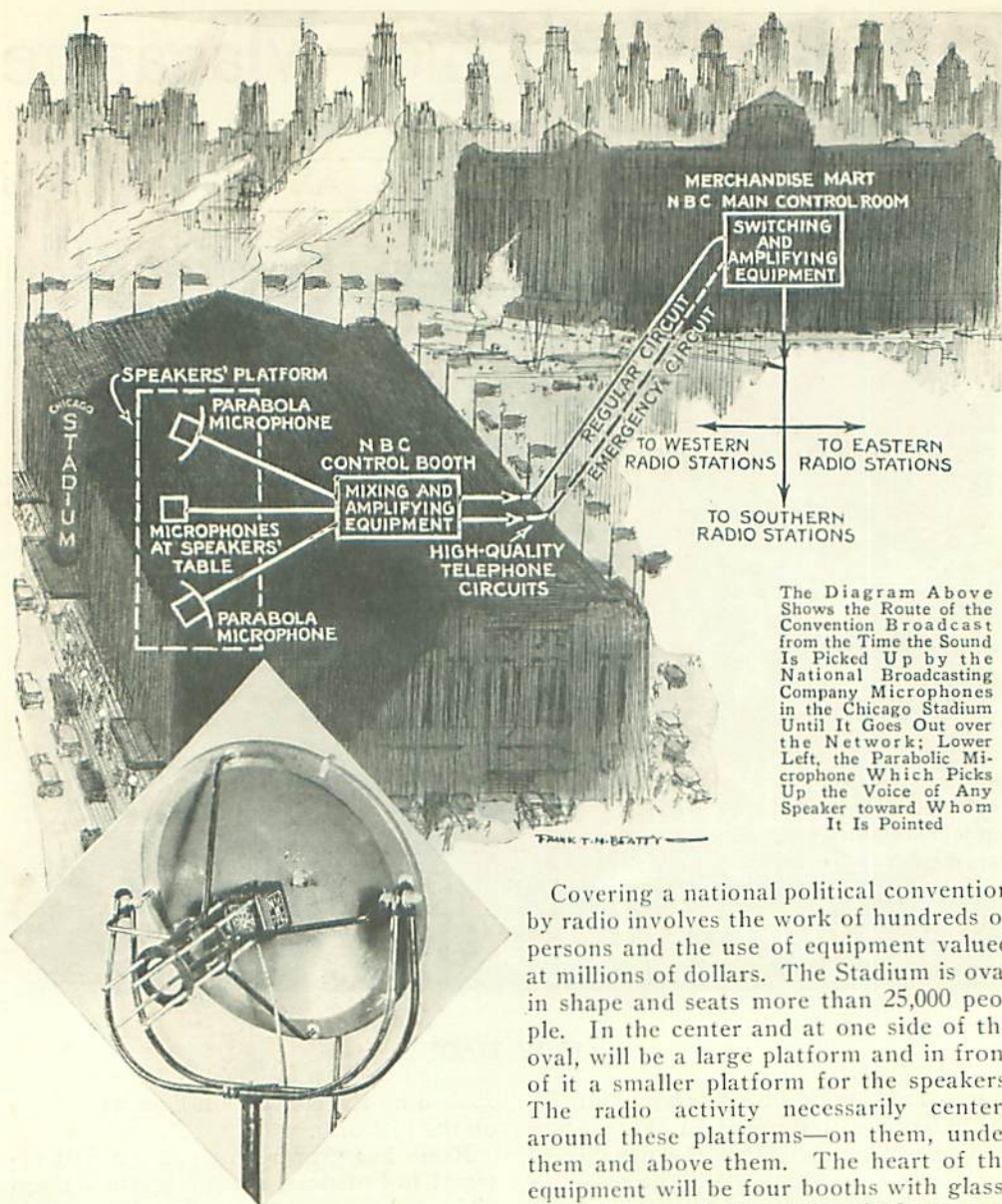
THE hammering of a gavel, on June 14, literally will resound in the waiting ears of millions, marking the opening of the Republican National Convention in the Chicago Stadium and the beginning of the greatest radio broadcast the world has ever known. A fortnight later the democrats will gather in the same arena and their oratory will be broadcast in a similar manner.

No matter who wins in November, those who listen in on the two conventions will have heard the next president selected and will be almost as conversant with the proceedings as the delegates, for the radio this year will bring you nearly every word

spoken on the convention floor as well as on the platform.

Radio has grown up since the first attempt to broadcast a national convention eight years ago, when the Alabaman's shout of "Twenty-four for Underwood" came in over the earphones. Remarkable strides have been made even since the conventions four years ago, until now the great broadcasting networks are prepared to present every sound of importance, whether a keynote speech, a band or a motion to adjourn.

One factor that will make this year's convention broadcasts bigger than ever is that there are more radios in use. The



The Diagram Above Shows the Route of the Convention Broadcast from the Time the Sound Is Picked Up by the National Broadcasting Company Microphones in the Chicago Stadium Until It Goes Out over the Network; Lower Left, the Parabolic Microphone Which Picks Up the Voice of Any Speaker toward Whom It Is Pointed

last census revealed over 16,000,000 radios in American homes, and it is estimated that each receiver has an average of more than four listeners, so the total possible American audience is over 68,000,000 persons. Add to this the people of foreign countries who will receive some of the proceedings by short-wave transmission, and it can be estimated conservatively that radio will bring the conventions to the homes of 100,000,000 people.

Covering a national political convention by radio involves the work of hundreds of persons and the use of equipment valued at millions of dollars. The Stadium is oval in shape and seats more than 25,000 people. In the center and at one side of the oval, will be a large platform and in front of it a smaller platform for the speakers. The radio activity necessarily centers around these platforms—on them, under them and above them. The heart of the equipment will be four booths with glass-incased fronts back of the platforms and slightly above them. One booth is to be occupied by the National Broadcasting company, a second by the Columbia system and the others by individual stations. At each window will sit an announcer and observer, and back of them, the engineers who manipulate the equipment to cut in the different microphones.

One of the unique features of the 1932 conventions will be the use of parabolic or "beam" microphones to enable listeners

to hear the remarks from the floor. There are to be two of these mikes used by one national network, one at each front corner of the speakers' platform. They will be mounted on rotating shafts so they can be turned by an operator beneath the platform, either from side to side or tilted up or down. These microphones might be described as the reverse of an automobile headlight. The latter focuses light on the road while the parabolic microphone collects the sound waves from any point toward which it is directed. The waves are gathered into a large concave, pressed-fiber bowl, and reflected back into the mouth of a microphone held on rods in the center of the bowl. Thus when a delegate on the floor rises to speak, one of the beam mikes is turned on him and the sound of his voice is collected before entering the microphones.

On the small speakers' platform will be the microphones into which the scheduled speakers will talk and the sound-picture microphones. Underneath the four control booths at the rear of the large platform, are to be four small soundproof radio studios. These are to be used for speech broadcasts. For instance, if a network desires to put on one of the leading convention figures for some interpretative statement, he is taken to one of these small studios. A communicating system keeps the engineers, announcers and the small studios in touch with each other.

In the case of a network broadcast, eight microphones will be employed ordinarily. There will be two parabolic microphones, one ordinary "mike" and a spare on the speakers' platform, one and a spare in the control booth and another with its spare in the small studio beneath the platform. The hall must be prepared acoustically to prevent reverberation and echoes.

When the gavel calls the convention to order, the sound will first strike the microphone diaphragm on the speakers' stand which will convert the sound into electrical impulses. These will be amplified in the microphone and travel by wire to the main field amplifier in the control booth at the back of the platform. From there the impulses go by telephone wire to the main control rooms of the national networks and from this point they are fed to the various distributing trunks.



Metal Reflector Which Gathers the Sun's Healthful Rays and Directs Them into the Face

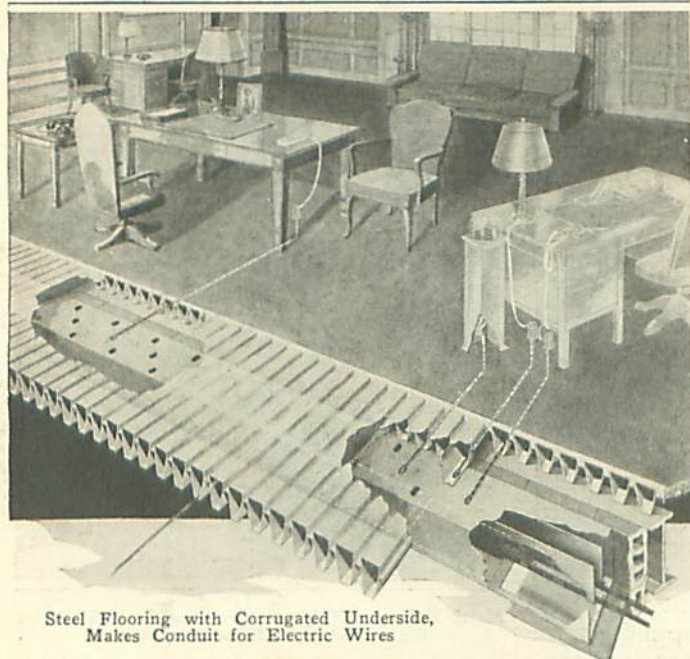
SUN'S HEALTH RAYS INCREASED BY METAL REFLECTOR

Concentrated sunshine is directed into the face by a health and beauty aid in the form of a multiple reflector which fits under the neck like a big collar. The semi-circular metal reflector gathers the health-giving rays and reflects them into the face without annoyance. It is used particularly in winter or in the lowlands where sunlight loses some of its effectiveness.

SAFE IN TAXI FOR FARE'S NAME PROTECTS THE DRIVER



Protection of the driver from robberies by passengers giving destinations outside the city is provided by a safe in Berlin taxicabs. When a fare desires to ride beyond the city limits, his name, address and fingerprints are taken on a slip of paper, which is locked in the safe on the dash. If the driver is robbed, police open the safe and find clues to the criminal.



Steel Flooring with Corrugated Underside,
Makes Conduit for Electric Wires

BUILDINGS WITHOUT A CONDUIT CARRY WIRES IN FLOORS

Steel flooring that not only serves as a structural member for multi-floor buildings, but also eliminates entirely the expensive electric-duct systems, has been developed. Through the use of the new flooring, future electrical needs can be arranged so that it is possible to place an electrical outlet within three inches of the place the appliance will be plugged in. The beams are prefabricated and can be placed by workers immediately following the erection of the structural steel. The underside of the flooring is corrugated in order to provide perfect conduits for the wiring.

EDUCATION IN CANCER BATTLE TO BRING CURE NEARER

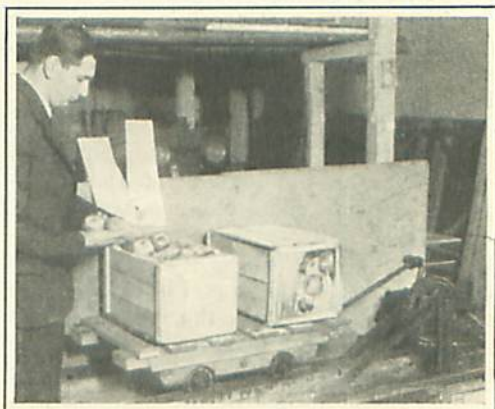
By educating children to the necessity of immediate attention to infections, the world will advance another step in its search for a cure for cancer. Secretary of the Interior Ray Lyman Wilbur, pointing to the success already attained in this direction, predicts that a cure will be found. But, he warns, the disease can be controlled only by lifting the bulk of the population out of the "Dark Ages" and instill-

ing in them a knowledge of personal care. The progress made in cancer treatment and prevention is due, Secretary Wilbur says, to early recognition of the seriousness of infection and to prompt and appropriate treatment. Those who have early symptoms must be placed under the expert's eye at once, so science can attack the growth before it reaches the advanced, and fatal, stage.

"APPLE KNOCKER" SHOWS EFFECT OF JOLTING

To determine just what happens to fruit in transit, the department of commerce constructed a small

car on a little track which reproduces the jolting to which fruit is subjected in a railway car. The test car, known as an "apple knocker," is loaded with fruit and run continuously for several days, after which the apples are unpacked and examined. The experiments showed that a common transit injury, firm, dark, flattened places on the lower side of bottom layers, results from the jolting. Tests also revealed that this injury can be prevented almost entirely by lining the boxes with corrugated cardboard.



Small Truck That Jolts Fruit in Crates, Reproducing
Conditions Encountered in Transit

In Moon-Bound Rocket! A Vision of Future



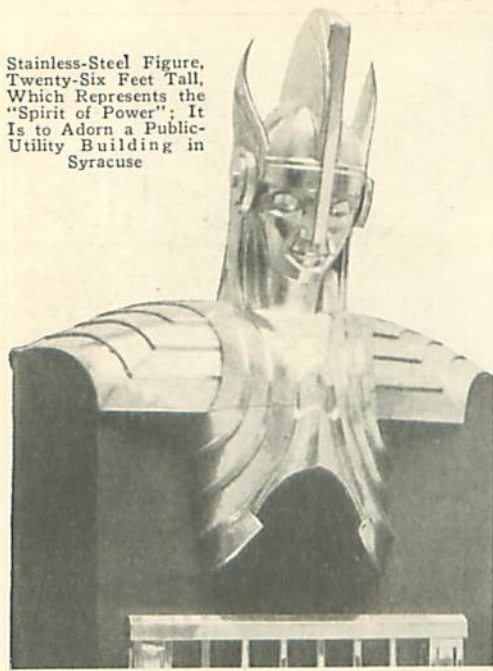
Courtesy, The Illustrated London News

Above is an artist's drawing depicting some of the physical conditions that would prevail in the passengers' compartment of a rocket ship on a flight to the moon—if such a thing were possible. The idea is at present fantastic, but there is sufficient scientific information available to predict with some degree of accuracy what would happen during most of the trip. The drawing shows how things would be when the ship was neither accelerating or decelerating. All objects, released from the at-

traction of gravity, would be without weight and either float in the air or stay where placed. A book, for instance, if released from the hand, would not fall but would remain suspended in the air. The man on the right, having found it impossible to fill his glass, is using a tube with a rubber ball to suck up water from a carafe and then press it into the glass. The passengers are represented as floating and the grips on the walls aid them in retaining their positions.

SPIRIT OF ELECTRIC POWER MOLDED IN STEEL

Stainless-Steel Figure, Twenty-Six Feet Tall, Which Represents the "Spirit of Power"; It Is to Adorn a Public-Utility Building in Syracuse



Stainless steel, a "Rezistol" product, has been wrought into a modernistic conception of the "Spirit of Power," as represented by electricity, to adorn the seventh story of a public-utility building at Syracuse, N. Y. The massive figure is twenty-six feet tall, has wings, twenty feet high with a spread of twenty feet, and a body and head twelve feet tall, while each hand holds a seven-foot shaft of light. It was fashioned by Machwirth brothers and is illuminated by concealed lamps, spotlights and floodlights. The feathers at the base of the wing are offset with concealed floodlights. Behind heavy glass in the breastplate is a spotlight to illuminate face and helmet, and rows of hidden lights extend down the torso. The shafts of light are produced by several lamps flashed behind opal glass. The metal is made by the Crucible Steel company of America.

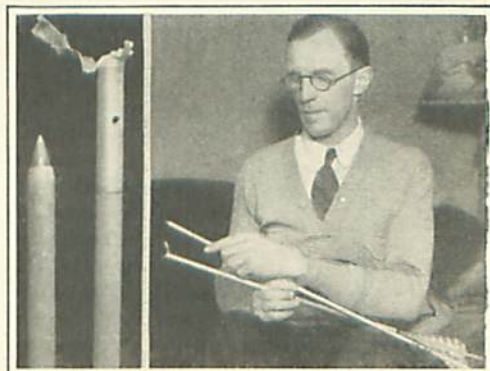
SOIL HEATING FOR ROOF FARM SPEEDS PLANT GROWTH

Plant growth at the roof-top farm of the General Electric company's research laboratory is speeded up by the applica-

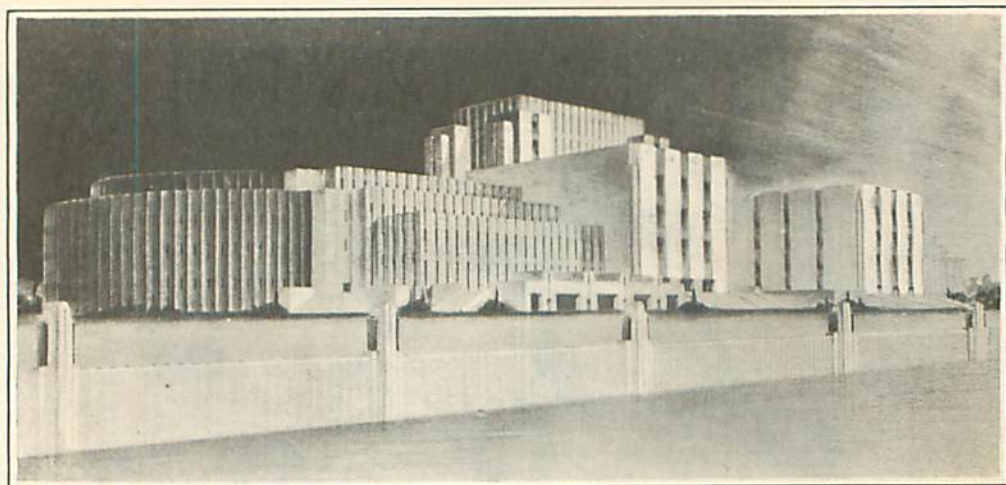
tion of electricity. Automatic heating of the soil by means of cables buried beneath the plant roots hastens the germination of seedlings, while controlled heat devices, placed near the plant benches, keep the temperature at the proper point to induce rapid growth. In addition, the laboratory is experimenting in X-raying seeds, seedlings and bulbs before planting. This already has resulted in the production of new varieties of tomatoes, sunflowers, cosmos and other plants. In the model greenhouse on the roof, plants will get only artificial light in a test of crop production under lamps of the same size, but burning at different wattages. Gas-filled bulbs will be used in other experiments. Tropical flowers and fruits, up-state New York vegetables and grapefruit, sugar cane and cotton from the south are growing side by side with tomatoes and redwood trees.

ARROW HAS EXPLOSIVE POINT TO KILL INSTANTLY

Medieval sport is combined interestingly with modern science in an invention by a California archer, who has fitted an explosive point on his arrows. The animal struck by the dart is killed instantly, according to the inventor, who declares the new arrow is more humane than a gun, since it cannot merely wound. Archery has become increasingly popular in sporting circles in recent years, but very few have become sufficiently proficient in the art to consider the bow and arrow seriously as a hunting weapon. It is believed, however, that an explosive arrow will overcome many of the objections.



Arrow with Explosive Point Which Gives the Archer as Much Efficiency as the Gunner



© International News Photo

Prize-Winning Design for the Russian Capitol, to Be Known as the "Palace of the Soviets"; the Modernistic Structure Will Have a Convention Chamber Seating 21,000 Persons

"PALACE OF SOVIETS" DESIGNED LIKE U. S. SKYSCRAPER

Called "Simplicity" by its designer, a New York architect, the Russian capitol, to be known as the "Palace of the Soviets," will be constructed on the lines of an American skyscraper. In appearance, it will be much like some of the buildings at the Chicago world's fair in 1933, being a modernistic adaptation of upflowing Gothic lines. The building, when completed at Moscow, will be one of the largest in the world, the convention chamber seating 21,000 persons. The first prize, amounting to \$6,000, was awarded the American designer, although his plans arrived after other entries were on display.

SHORT RADIO WAVE PEPPED UP TO GIVE MORE POWER

One of the greatest disadvantages of ultra-short radio waves—the limited power with which they could be used—has been overcome by an engineer for the Westinghouse Electric and Manufacturing company, who recently described a method found accidentally for packing more power into them. Some radio engineers hail the achievement as a step toward static-free and fadeless radio, since the ultra-short waves travel in a straight line and can be focused, and hence may overcome the two bugaboos of the longer ones now used for broadcasting. The new

development makes possible an output of at least five watts from a sixty-centimeter-wavelength transmitter. The bringing of a piece of metal near vacuum tubes of an ordinary transmitter resulted in the discovery. It was noted that the metal had to be in certain very exact positions to increase the output. The idea was incorporated in the short-wave set by introducing a sliding coupling of metal tubing between the plate and filament circuits.

BIG APPLE GROWN IN A BOTTLE CONTAINING MOIST SOIL

When an orchardist displayed a big red apple inside a narrow-necked bottle, he mystified his friends until he explained how it got there. Early in the spring a branch showing developing fruit was pushed into the bottle which contained a quantity of moist soil. The bottle was then tied to the branch to hold it in place and was left until the fruit matured. It was found that the apple growing inside the bottle was larger than other fruit on the same tree. When it was ripe, the branch was broken off and the soil was removed from the bottle.



How Olympic



Above, Pictures Used to Study Runner for Purpose of Correcting Faults; Left, Javelin Thrower Trying for Form and Accuracy

ALL over the world the most famous athletes are preparing for the Olympic games that are to be held in the United States this summer. In England, Japan, Spain and scores of other countries, thousands of track and field stars are in vigorous training. In the United States, athletes are getting ready to defend the championships they won at Amsterdam in 1928.

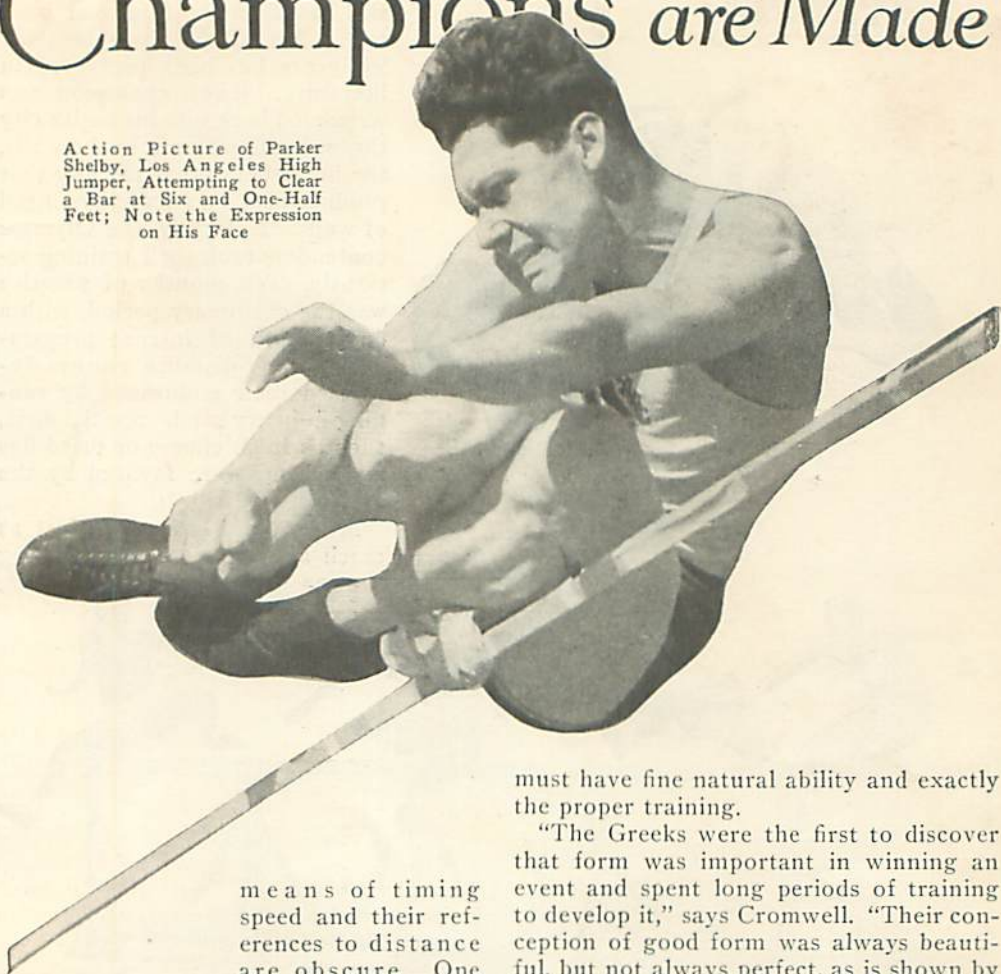
More than twenty-seven centuries ago,

other athletes were just as busily training for the original Olympic games. The ancient Greeks were great sport lovers, and if it were possible to bring some of the Olympic champions back to earth they would be worthy contenders. A search of early Greek literature shows that very creditable marks were set at the games, and that in some cases astonishing records were created. For instance, chiseled on the surface of a ponderous stone weighing 315 pounds, was found this inscription: "Bybon threw this rock over his head with one hand." Inscribed on another mass of rock near by were the words "Eumastus lifted this rock clear from the ground." The rock weighs more than half a ton.

Evidently the Greeks were great weight lifters, but it is doubtful if they could beat modern champions in every sport. Their actual records are vague. They had no

Champions are Made

Action Picture of Parker Shelby, Los Angeles High Jumper, Attempting to Clear a Bar at Six and One-Half Feet; Note the Expression on His Face



means of timing speed and their references to distance are obscure. One Olympic champion is said to have attained fifty-five feet in the running broad jump, but this seems to be a mistake in translation. Sports authorities refuse to believe that a human could jump so far, even with the weights that the Greek jumpers carried to increase their distance. The weights, similar to dumb-bells, were carried one in each hand and were swung forward at the moment of the leap.

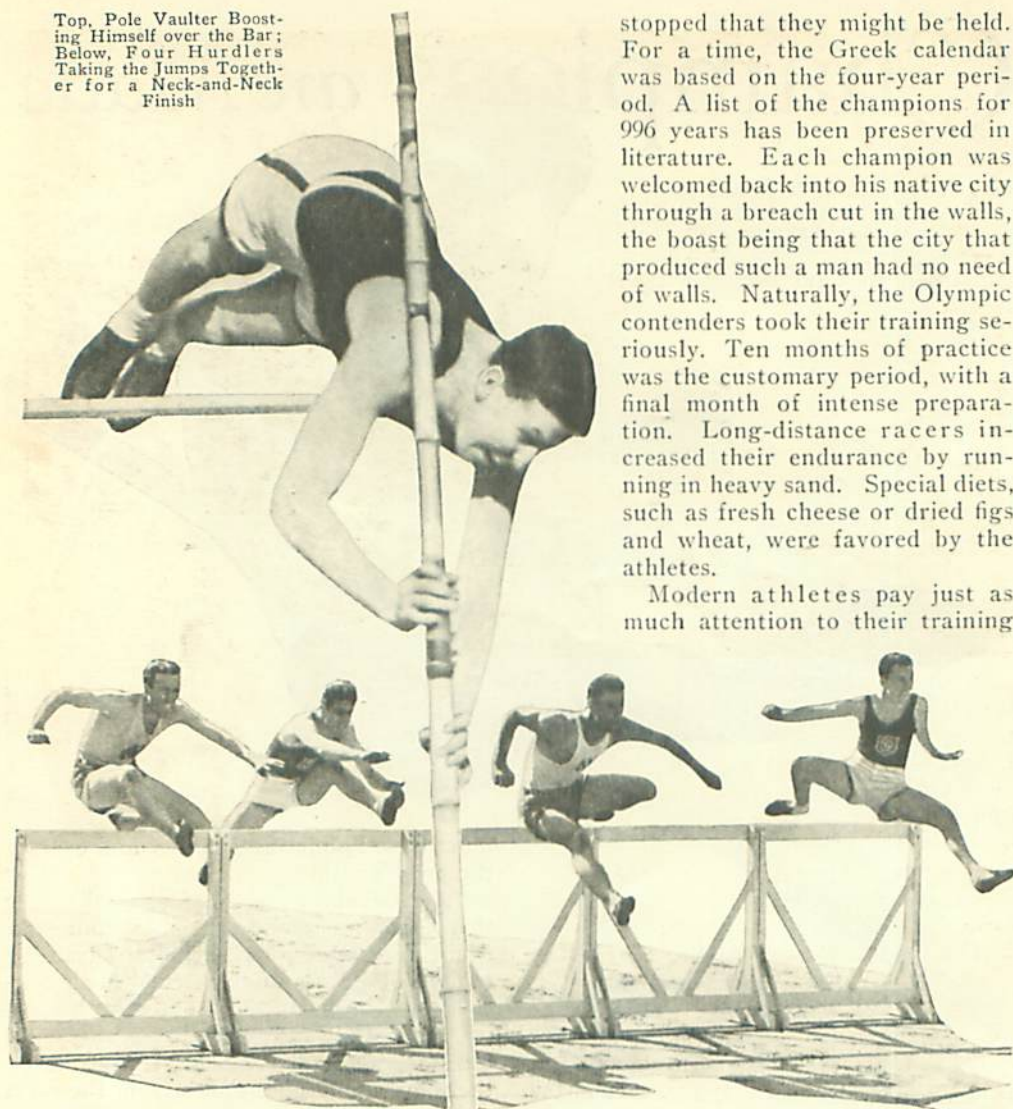
Coach Dean B. Cromwell, the American maker of champions, who has produced Charley Paddock, Borah, Wykoff, Barnes, Houser and other famous stars, holds that modern athletes are much superior to the Olympic champions of bygone ages. To become a champion athlete, he says, you

must have fine natural ability and exactly the proper training.

"The Greeks were the first to discover that form was important in winning an event and spent long periods of training to develop it," says Cromwell. "Their conception of good form was always beautiful, but not always perfect, as is shown by old statues and decorated vases. In these there are many differences from the form that is taught today. The famed statue Discobolos, showing an Olympic champion preparing to throw the discus, represents the Greek form of throwing, but is far different from the modern style. Discus throwers have tried both the old and the new form and invariably they throw greater distances when they use the new, free style."

The ancient boxers wrapped their fists with strips of rawhide and other materials with which they dealt punishing blows, aiming principally at their opponents' heads. There were no rings, and the battles continued until one man was defeated. Wrestlers rubbed themselves with oil

Top, Pole Vaulter Boosting Himself over the Bar;
Below, Four Hurdlers Taking the Jumps Together for a Neck-and-Neck Finish



and were then sprinkled with sand. The wrestler who touched the ground with any part of his body above the knees was down. Javelin throwers cast their spears with a long leather thong wrapped around the javelin, by means of which a rotary motion was imparted to the shaft as it left the hand. Runners ran barefoot and were restrained from false starts by a rope stretched across the course, which was dropped when the signal was given.

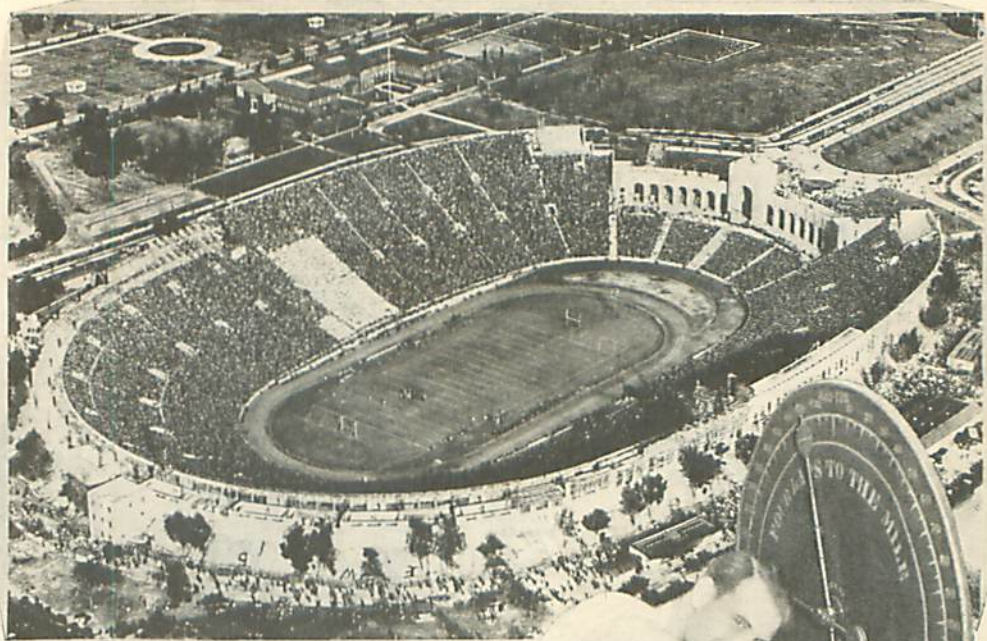
The Greeks considered the games so important that wars were

stopped that they might be held. For a time, the Greek calendar was based on the four-year period. A list of the champions for 996 years has been preserved in literature. Each champion was welcomed back into his native city through a breach cut in the walls, the boast being that the city that produced such a man had no need of walls. Naturally, the Olympic contenders took their training seriously. Ten months of practice was the customary period, with a final month of intense preparation. Long-distance racers increased their endurance by running in heavy sand. Special diets, such as fresh cheese or dried figs and wheat, were favored by the athletes.

Modern athletes pay just as much attention to their training

and are in better shape when they compete. In addition to better-balanced diets and a more thorough knowledge of how to get into shape, they have the advantage of training devices that develop the muscles they need the most. Most of the athletes who will compete this summer have been limbering up on indoor gymnastic apparatus for months.

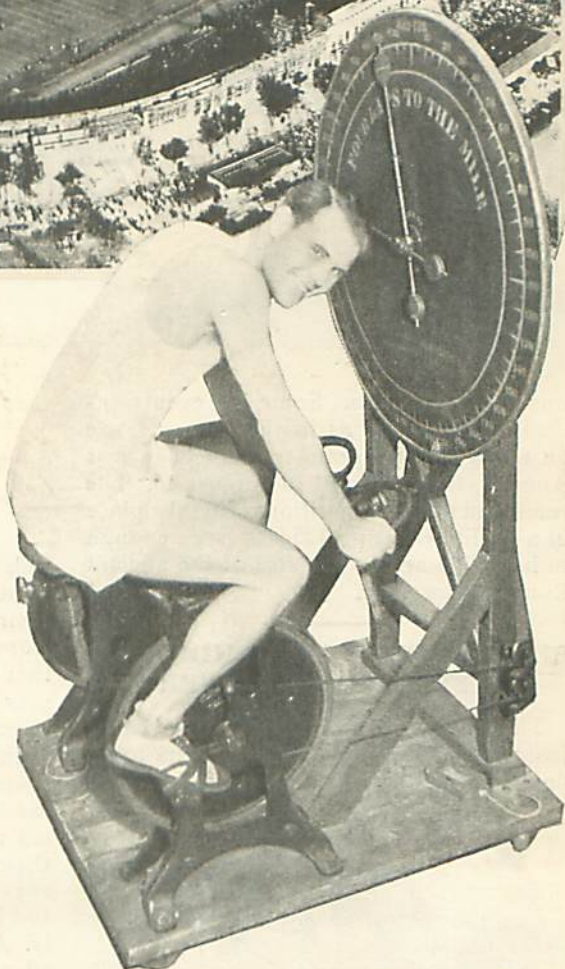
"These preliminary exercises are especially important for pole vaulters," explains Cromwell. "Doing push-ups on the parallel bars develops their shoulders and arms so that they can force themselves high above their handgrips to clear the



bar. This sort of work was a big part of the training I gave Lee Barnes before he set the world record of fourteen feet one and one-half inches for the pole vault. Runners strengthen leg and stomach muscles in the gym on bicycling machines and on the regular apparatus. Shot putters and discus and javelin throwers have special exercises, including punching bags, that increase the power of their throwing arms."

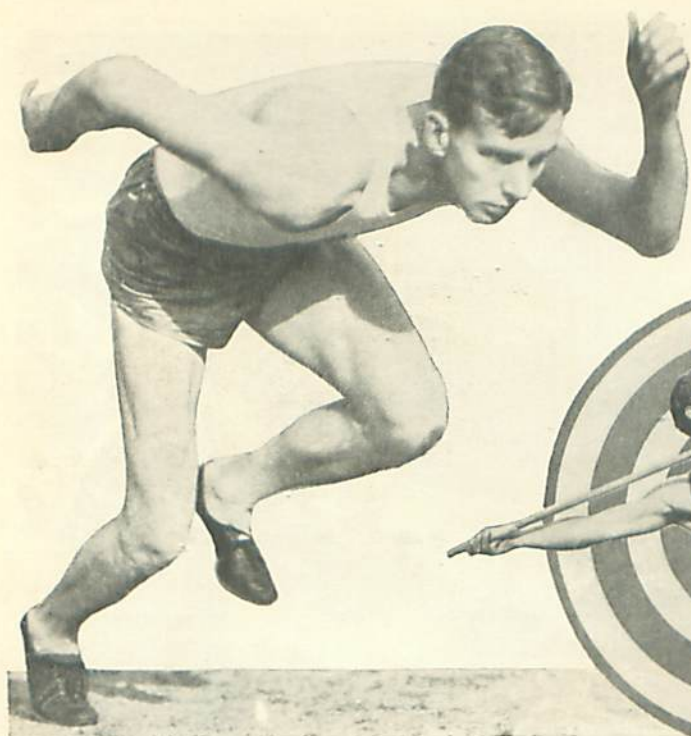
Photography plays an important part in the final stages of outdoor training, according to Cromwell. Slow-motion pictures are taken of the individual athletes so that he may study their actions at his leisure. Then the pictures are thrown on a screen and slight corrections in form are pointed out to the athletes in a manner they can actually see. Enlarged still pictures are also used to point out and remedy faults. A series of pictures showing a runner in various positions in his stride quickly convinces him that he swings his arms too much or makes other mistakes that hinder his speed.

The original Olympic games started



Top, Aerial View of Olympic Stadium, Los Angeles; Below, Bicycle Machine on Which Sprinters Exercise Leg Muscles

about 884 B. C., and continued with a few interruptions until A. D. 394. The modern Olympic games were started in 1896 with an international track and field meet that



Left, Sprinter in Action Just After the Starting Pistol Had Cracked; Below, Kenneth McKenzie, Javelin Thrower of University of Southern California



was held in Athens. Some 135 events, including competitions in the fine arts, are on this year's program to be held in Los Angeles, from July 30 to August 16. The track and field competitions will take place in a stadium seating 125,000, large enough to hold two arenas the size of the ancient Roman colosseum.

BIRDS SAVED BY FLUSHING ROD ATTACHED TO MOWER

Thousands of game birds will be saved from the mower's blades if farmers use a flushing rod devised in Wisconsin. The



How the Flushing Rod Is Attached to the Mower

rod, attached to the mower and moving ahead of the blade, flushes the birds from their nests on the ground. The operator stops the mower, finds the nest and leaves that patch of grass uncut so that the birds may return until the eggs are hatched. In Wisconsin, the hatching season of the Hungarian partridge comes at about the same time hay is cut. Since hay fields are favorite nesting places for this bird, farmers must watch carefully to avoid killing them and destroying their nests. White rags tied at intervals along the flushing rod help to frighten the birds more quickly. A great saving on restocking is effected, as the birds cost \$4 each.

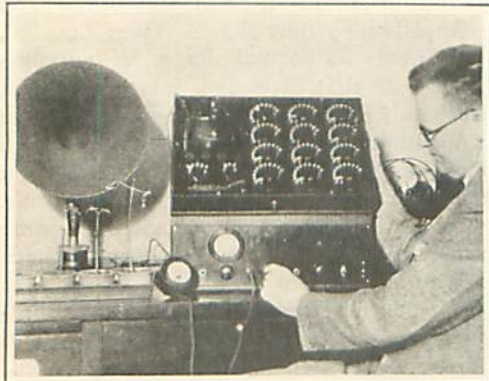
Visitors to Kegan waterfall, the "Niagara of Japan," are spared a tortuous mountain descent by elevators which carry them down a shaft cut through 325 feet of solid rock.

BUILDING MATERIAL OF FUTURE TO BE SYNTHETIC

Tomorrow's building materials are metal, glass and synthetic materials, many leading architects agree. Important among these synthetics is "micarta," a laminated molded material, which is now available in new designs and colors, and it is becoming increasingly popular among builders and architects. Micarta consists of sheets of paper or cloth which are treated with phenolic resins, then subjected to high temperature and tremendous pressure. The resulting product is metal-hard but warm to the touch. In buildings, sheets of micarta are employed as panels, window sills, baseboards, store fronts and as desk, counter and platform tops. It comes in many colors and in an unlimited number of designs.

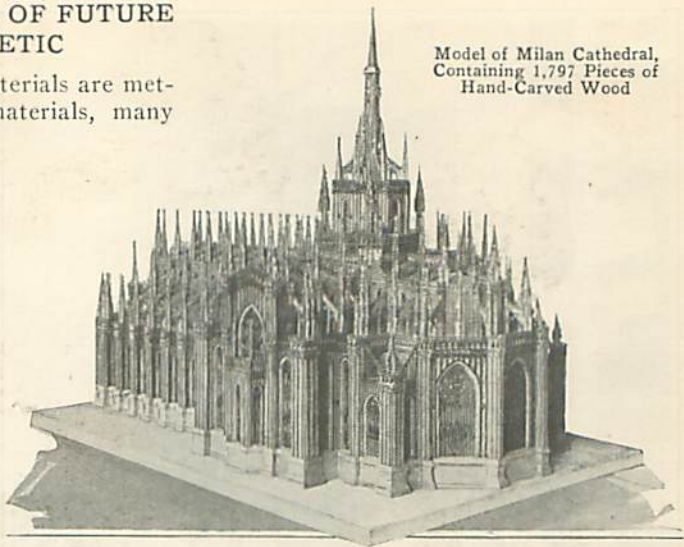
ELECTRICAL ENERGY OF SEEDS PREDICTS SIZE OF PLANTS

It is now possible to predict to some extent the size of plants even before the seeds are placed in the ground. This is done by means of an electrical instrument which measures with precision the electric energy radiated by seeds. This energy has been found to have a relation to the growing qualities of the seeds, so that large, healthy plants will be produced.



Instrument to Measure Electric Energy Radiated by Seeds and Test Their Growing Qualities

Model of Milan Cathedral,
Containing 1,797 Pieces of
Hand-Carved Wood

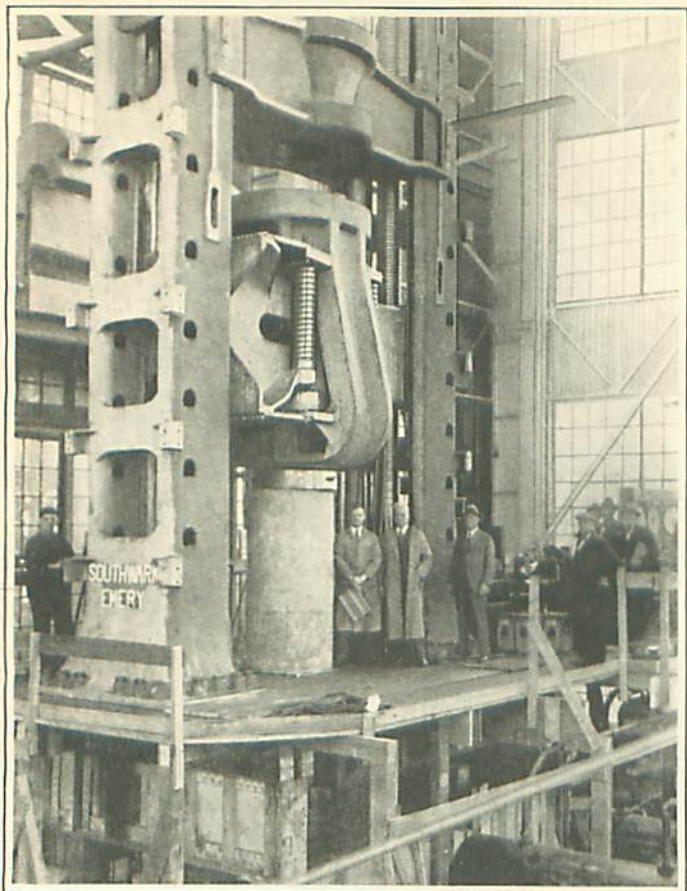


MODEL OF FAMOUS CATHEDRAL CARVED FROM WOOD

One of the most complicated pieces of wood carving in existence is a model of the famous cathedral of Milan, Italy, made entirely by hand. The miniature contains 1,797 pieces and more than three years were spent in constructing it. There are 153 steeples and statues, and all pillars and walls are ornamented with carvings. The structure contains over 150 windows, which are fitted with imitation grill and lace-work designs. Back of the grills are pieces of colored paper to give the effect of stained glass. The model is electrically lighted and contains chimes which sound when the lights are turned on. It is fifty-two inches long and the tallest steeple towers thirty-nine inches.

RAYON FROM SUGAR CANE

Sugar-cane waste has been turned into a new source of rayon, a silklike dress material, by a process developed by the U. S. department of agriculture. High-grade cellulose is produced by applying nitric acid to the waste cane left after the sugar has been extracted. The process is cheap and simple. Half a million tons of this waste is accumulated each year by the sugar mills, but until the rayon process was discovered, most of it was used in manufacturing insulating materials and as fuel for the mills.



Hydraulic Testing Machine Constructed for the University of Southern California; It Exerts a Pressure of 3,000,000 Pounds

SIXTY-FOOT HAMMER DELIVERS THREE-MILLION-POUND BLOW

Capable of smashing six-foot slabs of concrete as though they were pasteboard, a huge hydraulic testing machine has been built for the University of Southern California. This giant hammer, sixty feet high, exerts a pressure of 3,000,000 pounds, more power than is possessed by any similar apparatus.

BIGGEST LITTLE IDEA REVEALS ROMANCE IN INVENTION

The invention and development of the automatic disk-type thermostat reveals the romance that lies in inventive genius. The device is used in electric appliances where automatic heat control is desired. In his youth, according to Ralph Leaven-

worth, of the Westinghouse Electric and Manufacturing company, "Al" Spencer was a night watchman at his grandfather's sawmill up in the Maine woods. He noticed that the fire door of the boiler bulged out when it became hot and contracted when it cooled. When the fire got hot, the round iron plate in the door bulged outward, not gradually, but suddenly, and with a loud snap. When the fire died down and the door cooled, the plate snapped back to its normal position with the same kind of a noise. Later in life, he fashioned a device in which a small disk operated a gas light. In another application a similar disk functioned in an automatic valve for steam radiators. If it worked for this purpose, why wouldn't it connect and disconnect an electric current? John Alby Spencer kept trying. Finally he fused together thin disks of two metals

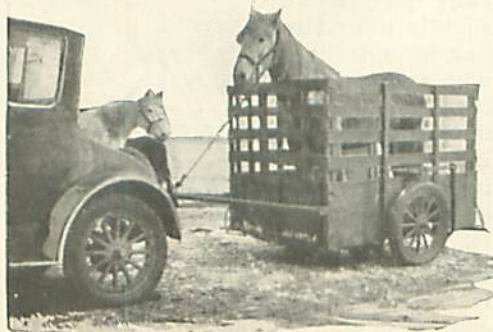
having different coefficients of expansion. At the same degree of heat one of these expanded more than the other. This caused a pull between the two. At a certain point, as the heat increased, the disk snapped into saucer shape. When it cooled, it resumed its normal shape. When engineers saw that little disk jump three feet in the air as it cooled, they recognized the thing that would make and break electric circuits. Best of all, it would act with the speed of a rifle bullet. This speed would prevent the formation of a troublesome arc. They decided to see how many times it would function without a failure. It turned in a perfect record of 500,000 performances. Not a miss in half-a-million trials. And so this device became one of the biggest little things in the electrical industry.

FORTY CENTURIES OLD LETTER HAS CLAY ENVELOPE

Business of forty centuries ago operated every day of the five-day week, like that of Soviet Russia, according to translations of tablets or letters found in the land of the Hittites and Assyrians. Each letter has its clay envelope in which it was forwarded. Dr. I. J. Gelb, of the University of Chicago, in translating the letters, found one which said: "I am returning herewith the one-half mina of silver which I owe you, and if you again request payment, I have the right to kill you." Translation of other tablets shows that the calendar of that time had only five days in the week, while the weeks and years were named for officials. The letters were found in a building excavated by the Hittite Expedition of the Oriental Institute of the University of Chicago.

TRAILER SAFE AT HIGH SPEEDS CARRIES LOAD LOW

Carrying its load only three inches above the road clearance, a trailer that will not sway or tip over at high speeds is in use. The low-load point is designed to make the trailer safer than other spring-equipped vehicles, in addition to making it easier to load, and has been found especially practical for the transportation of horses.



This Trailer Is a Good Means of Transporting Animals, Since Overturning Is Almost Impossible



As the Runner Paces beside the Bicycle, Apparatus Mounted behind the Rider Measures Energy Expended

RUNNER'S ENERGY IS RECORDED BY TEST TUBE ON BICYCLE

Energy expended by an athlete as he races around the cinder track is measured by recording instruments carried on a bicycle. The runner's exhausted breath passes from his mouth through a tube to the bicycle, and is stored in containers hauled by the cyclist. This method has been used in an effort to obtain data on how athletes build up living matter and how the living material is broken down.

COTTON PLANTS RAISE FEVERS

Diseased cotton plants have "fevers" with symptoms so human that thermometers can be used in diagnosing and treating the illness. Walter N. Ezekiel and J. J. Taubenhau, of the Texas agricultural experiment station, have found that the leaves of cotton plants about to succumb to root rot are warmer than those of healthy plants. Knowledge of this fever helps in diagnosing the disease. In summer, healthy leaves have a temperature around ninety-five degrees, while diseased temperatures can be taken in ten seconds by wrapping the leaf around a mercury thermometer. The experimenters attribute the fever to a choking effect in the roots due to the rot, which restricts the water supply to the leaves.



Photo Ewing Galloway
Statue of Death Holding a Badly Worn Tire Stands at Dangerous Spot on the Road, as Warning to Auto Drivers

STATUE WARNS AUTO DRIVERS OF WEAK-TIRE DANGERS

Warning automobile drivers of the dangers of weak tires, a concrete figure has been erected on the roadside between Berlin and Potsdam, Germany. Many accidents on this road have been caused by failure of badly worn tires.

CLASS IN EXPLOSIVES TAUGHT SAFE WAY OF BLASTING

How to handle explosives in safety is being taught students in a course at the Michigan state college. Practical methods of using dynamite and other high-power blasting powders are taught. To show that explosives can be used with safety even in congested areas, the class blasted away an old concrete foundation within seventy-five feet of one of the college buildings. Divided into groups and directed by experts, the students learn how to blast for

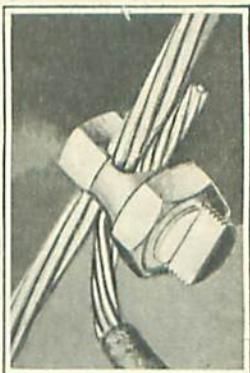
ditches, remove rocks and tree stumps and prepare land for engineering, agricultural and landscaping purposes.

PLATINUM FOG FORMS RICHEST OF MISTS

Turned into a high-priced mist, platinum is being used for coating a wide variety of materials. Smoother than dew, the costly fog can be used for covering fibers, converting them into filmy threads that seem made of pure platinum. Such threads may become wires in various precision instruments, or fibers of a platinum gown. The precious metal is caused to evaporate like water when it is electroplated to tungsten, intense heat being applied to the latter in a vacuum.

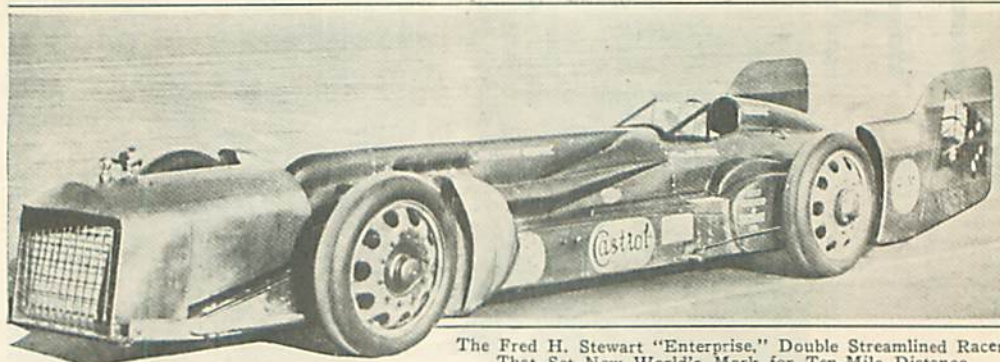
CONNECTOR LIKE A VISE SIMPLIFIES LINE WORK

Operation of a wire connector recently developed is exactly like a vise, making connections that not only do not slip, but, since it is made of copperized metal, assures perfect electrical contact as well. The connector is made in the shape of a bolt, threaded the full length to the head. The head is then drilled and the bolt split from the drilled cylinder downward. A tongued section, that projects slightly over the bolt head, is fitted with a slot so that the nut will slide the tongue tight as it travels up the half-thread. The connectors are



made in seven sizes from which several hundred different combinations can be made. They have been found particularly efficient in high and low-tension line work and for transformer and house-service leads. They are quickly placed or removed.

Giant Racer Sets New Mark for Ten Miles



The Fred H. Stewart "Enterprise," Double Streamlined Racer That Set New World's Mark for Ten-Mile Distance

A new speed record of 164 miles an hour for ten miles was set recently on Ninety-Mile beach in New Zealand, by a giant racing automobile driven by Norman Smith. The car was the Fred H. Stewart "Enterprise" and, like Sir Malcolm Campbell's and Maj. Sir Henry O.D. Segrave's cars, was British-built. Much the same size as both these monsters, it differs materially from Sir Malcolm's racer by having a double tail surface, one behind each rear wheel.

BIRDS CAUSE QUEER ACCIDENTS TO PLANES IN FLIGHT

Pilots gave little thought to birds when airplanes were slow, but now that they have become the fastest of man's conveyances, birds have become a menace. Two recent "freak" accidents have been reported as the result of collisions in the air with hawks, crows, buzzards or kites. One of these was caused at an altitude of only thirty feet when a kite struck the plane, tearing off a propeller blade and turning the plane over in a field. Another, and even more thrilling, encounter was reported by a British army officer in India. He was flying at about 1,500 feet, when a sudden vibration through the plane decided him to make a rapid but careful landing.

The leading edge of one of the lower planes had been crushed by a blow, and mechanics found a kite-hawk that had fallen near by with every bone broken.

BOAT WITH ADJUSTABLE CABIN CRUISES OPEN OR CLOSED

Designed for smooth or rough water, an outboard-motor boat equipped with a sliding or adjustable cabin is now on the market. The cabin, by sliding aft, leaves the seats exposed and the boat operates like an open runabout. By sliding forward, the cabin makes a watertight connection with the windshield, protecting passengers from heavy seas. The backs of the seats can be let down to make a comfortable bunk for two. A cookstove, food locker and other conveniences are included. The outboard motor drives the boat more than twenty miles an hour.



When Clouds Form, Sliding Cabin Is Made Fast to Windshield; in Fair Weather, Cabin Is Pushed Back and Boat Becomes Open Runabout

THE HELL OF



By XAVIER DE HAUTECLOCQUE

GO where you may, bury yourself in the heart of Africa, you will hear of Smara, halfway along the course of Sakiet el Hamra, spoken of with respect mingled with fear; Smara, the mysterious city, the capital of the Moors, never violated by infidels; Sakiet el Hamra, the "red" river whence start all the raids that still ravage the dark continent. Of these places marvelous and terrible tales are told. Legend peoples it with phantoms and monsters.

Michel Vieuchange, twenty-six-year-old Frenchman, has exploded this legend. He has evoked the phantoms—the Reguibat Moors—out of their shadows; he has braved the monsters—the devouring fever-breeding sun of this immense waste.

He spent a year in preparing for his exploration of mysterious Rio de Oro. He knew that he had to conquer almost insurmountable difficulties. Rio de Oro is

A Land of Mystery!

ON maps of Africa, you will find a region that heretofore has been white, that is, free and unexplored. This is Rio de Oro, a vast desert that stretches from the southern tip of Morocco to Mauretania.

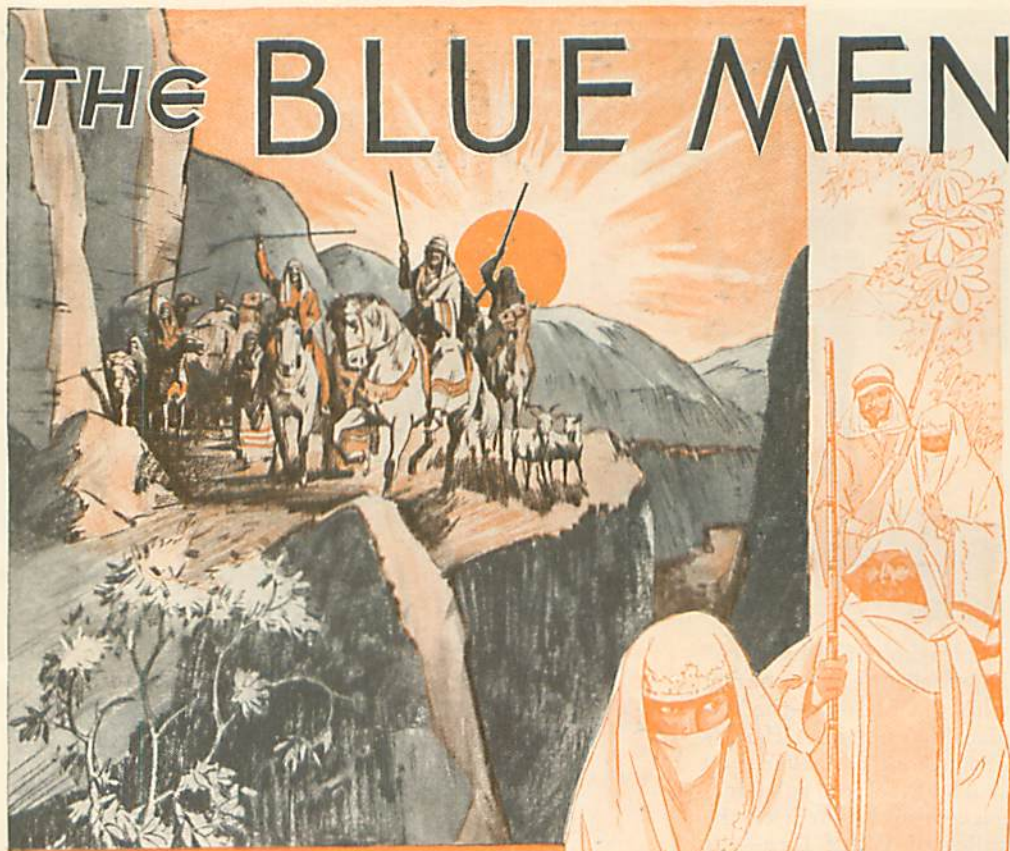
Weird stories were current about this desert where the Moor warriors roamed, indomitable, ferocious, blue-veiled. Smara, their capital, was reputed to be an unspeakable rendezvous of cutthroats. Thence started the raiders who even today devastate the dark continent from southern Algeria to the center of Sudan.

A young Frenchman, Michel Vieuchange, resolved to bare the secret of Rio de Oro. Disguised first as a woman, then as a Moorish tribesman, he succeeded in entering mysterious Smara—but at what price of danger and suffering!

On his return, he died of exhaustion.

This story is based on his notes during the expedition, recovered by his brother, Jean Vieuchange, and written by Xavier de Hauteclocque.

THE BLUE MEN



the rendezvous of arms contrabandists, of the last slave dealers and the terrible raiders who spread devastation to the heart of Africa. It goes without saying that the Moors keep strict guard here. Smara, the capital of this strange country, some hundreds of miles inland in the desert sands, is especially well garrisoned.

To enter this forbidden land, Michel Vieuchange disguised himself as an Arab woman. He started accompanied by two real Moorish women, Bous and Fatima l'Outanienne, and three guides, Ahmed el Mahbul, his brother Larbi, and Chibani. No baggage; only strictly indispensable medicines, photographic apparatus, films, a notebook, a compass. Driving before them two asses, they entered upon their adventurous journey. They passed Tiznit, the red-walled outpost of the unorthodox zone and Talaint, residence of the alcaide Laiadi. From there on, every European is in constant danger of death.



Michel Vieuchange, with a Guide, before His Expedition



Caravans of "Blue Men" appeared, the first contact with the Moors—the implacable enemies. Hours of barefoot marching on sharp gravel in a solar furnace brought them to the valley of Wadi Dra—the mysterious river on the northern border of Rio de Oro which white men always have considered the frontier of death. The country becomes darker, more sinister. For two weeks they are forced to rest in the village of Tigilit, where two evil-looking natives are enlisted as guides and the women left behind.

The weary march began again, sometimes riding, more often on foot. Day after day, the struggle went on under the blazing sun, choking with thirst, with nothing to drink but the sour and fetid water that had to be carefully economized in its skin bottles.

Now there appeared on the worn-out feet of the Frenchman great sores that spread and festered. His savage guides saw in these wounds the curse of Allah, and it was only by more and more lavish promises that he persuaded them to go forward. His own notes tell clearly what he felt:

"Day follows day. I hardly notice how



they pass. We walk, and walk, and suffer. We cling to the walls of cliffs and drop into dark valleys."

Then his guides refused to go any further. They were ill and frightened. No one could violate the sacred city of Allah and live. It was impossible

to convince them. The party turned back to Tigilit.

Disappointed and harassed, but not discouraged, Vieuchange at once made plans to return to the desert. The whole terrible itinerary was repeated—the Dra, the black mountains, and the deep gullies. Burning days followed freezing nights. The caravan plodded for days in a lifeless, motionless sea of sand.

But Smara was approaching, and as he neared it, the enthusiasm of the Frenchman once more sprang to life. He no longer crouched half-dead in the shadows. Like the guiding hand of a prophet, it was he who often led the party. At last, they sighted the city, last refuge of the mysterious Sahara. Scouts sent ahead brought back word that two great encampments of Arabs were behind the forbidden city. But in the place itself there was no

living person, not a sign of life. By this time Vieuchange was so worn out that he was being borne in a boxlike bed on the back of a camel. Five miles from the city it was no longer possible to restrain him. He insisted on riding on the camel's back, while he viewed with triumphant eyes the city for which he had undergone so much.

Smara is a true city of the desert, lonely, lifeless and burning hot. A city of houses in which no man lives. Back of it a little burned patch of grass, and still further away, a group of palms.

Vieuchange and his party entered the city unseen. They wandered from house to house, and from street to street in this ancient queen of darkest Africa, now dejected and forlorn, guarded with reverent awe, but deserted as the waste of sand about it. There was no time to lose. At any moment, a scouting party might enter to see that all was well.

It was difficult to get Vieuchange away. He seemed intoxicated with the realization of his dream. He fought with the men who were wild with fear. He visited the ancient mosques, the towers and domes. The alarm sounds, but he heeds it not. At last, his men, having reached the limit of their patience, carry him off by force.

Vieuchange himself, though at the point of death, was quietly satisfied. His men shouted and sang, and threw their rifles and hats in the air for very joy. On the return, brave-hearted and daring traveler, he died in the arms of his brother who reached him by airplane. He died a hero, for he had torn the veil of secrecy from the mysterious country of the Blue Men.



Top, Map Showing Rio de Oro and Smara, Capital of the Moors



Growing Flowers, Arranged in Garden Fashion in a Bottle, Reflect Ingenuity of Woman Exhibitor

REAL GARDEN IN GLASS BOTTLE EVEN HAS TINY LAKE

Growing flowers arranged in a garden inclosed in a glass bottle were exhibited at a recent flower show. The garden even had a tiny lake, made from half of a hollow rubber ball. Several species of flowers surrounded the lake. The bottle garden was prepared by Mrs. H. M. Gun-niston, of Scarsdale, N. Y., in five hours.

MIRROR OF PINK-TINTED GLASS GIVES NATURAL IMAGE

Persons who desire to see a reflection of ruddy health when they look in their mirrors can satisfy the longing, even if they are pale and anemic, by using pink-tinted glass. These mirrors are tinted approximately the same color as the skin of the normal Caucasian and reflect a warm, ruddy, lifelike image which is often a bit flattering. Aside from being used for mirrors, the glass, when employed as a desk top, helps bring out the natural beauty of walnut, mahogany and similar grained woods. Another form of plate glass has been termed "water-white" because it is virtually colorless, even when viewed on edge. Ordinary glass transmits only a small portion of the violet and blue rays, but the water-white type allows all the colors to pass in corresponding density. In mirrors, this glass makes possible an

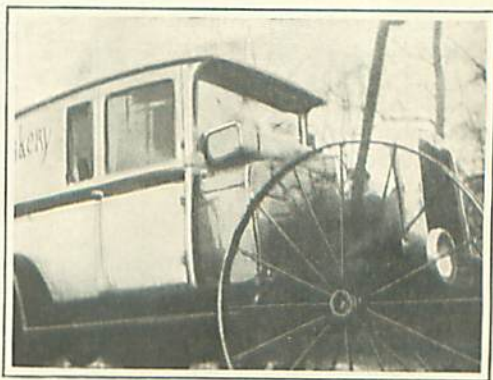
exact reflection as it appears to the normal eye, since all the colors of the visible spectrum are reflected.

FUTURE GARDEN MAY BE PAVED INSTEAD OF PLOWED

Backyard gardens of the future may be paved instead of plowed. For some time, agricultural experts have been experimenting with gardens covered with blocks of concrete, iron, zinc and aluminum, small spaces being left only where the plants are to stand. The tests grew out of attempts to use paper mulch and the discovery that beans, peas, strawberries and other plants would grow as well under the permanent mulch as with ordinary cultivation. Cinder blocks, a few inches thick and nine or ten inches wide, were laid in rows one and one-half inches apart, the purpose being to retain moisture and keep down weeds. Rain soaks into the ground through the cracks, and if the blocks are painted black, it was found they also absorbed more heat. Soil covered with such blocks has been productive since 1928.

HIGH FRONT WHEELS ON TRUCK FOR USE IN DEEP WATER

During floods in some towns of the lower Mississippi valley, delivery trucks made their regular trips through water-covered streets by substituting wheels from hay



Truck Fitted with High Front Wheels So It Can Be Operated in Several Feet of Water

rakes for the regular front wheels. The high wheels enabled the trucks to proceed in water three or four feet deep without flooding the engine.

Radio-Phone Exchange Is "Tower of Babel"



© Postmaster General, London

With Operators Talking in Several Languages at the Same Time, This Telephone Exchange Offers a Queer Mixture of Sounds to Visitors; Note the Switchboard Arrangement for Calls to Half a Dozen Countries

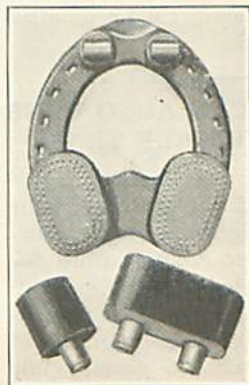
London's overseas telephone exchange, recently opened, is a veritable "Tower of Babel" in a modern setting, for here telephone conversations are routed for the United States, Latin America, India, Japan, South Africa, Australia, New Zealand, Europe and ships at sea all hours of the day or night. There are 150 girl operators, speaking French, German, Spanish and Italian, in addition to their native tongue, as the calls come through the boards. The service is so swift that it is possible for one in London to speak, within an hour, with persons as far away as Honolulu, Cape Town, Sydney, Buenos Aires, New York or Tokyo.

CUTTING EDGE ON SUPER LATHE HARDER THAN SAPPHIRE

With a cutting edge harder than sapphire, a super lathe has been built for the General Electric company. Tantalum carbide, which is used for tipping the cutting tool, is worth \$480 a pound. The lathe, with 100 horsepower, has a cutting capacity of 650 feet a minute on nickel-alloy-

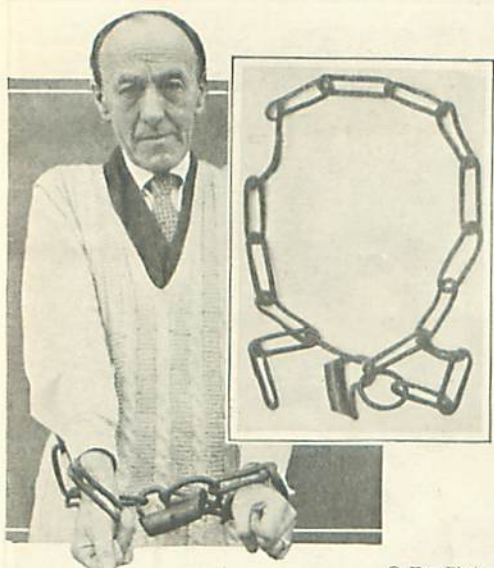
steel turbine shafts and 450 feet a minute on rough cuts. This is about five times faster than the ordinary machine. Research work will be done on the lathe, attention being given to the efficiency of tantalum carbide in cutting steel. A chip-breaker device curls the steel chips as they fall from the machine, breaking them off and dropping them into a pan.

RUBBER GRIPS ON HORSESHOES PREVENT SLIPPING



Horses are prevented from slipping on oily and wet streets by rubber grips on their shoes. The rubber pads take up much of the shock from constant pounding on paved streets. The calks can be replaced without removing the shoe from the hoof.

GRIM RELIC OF PIRATE DAYS BROUGHT UP BY DREDGE



© Fox Photos
Manacles Once Used to Shackle Hanged Pirates; the Chain Was Recovered from the Thames River

While dredging in the Thames river, workmen recently brought up a grim relic once used to shackle pirates condemned to death and hanged from Execution dock in London. The iron shackle consists of a chain, padlock and harness placed around the body and wrists of condemned men. The manacle has been lying on the river bed for more than a century, and one link of the chain is missing. When the notorious Captain Kidd was hanged, his body was placed within a harness chain after he had hung on the gallows. Kidd was kept hanging in the chains until three tides had flowed over his body as an object lesson to passing seamen. It is believed the chain was attached only after the victims were dead.

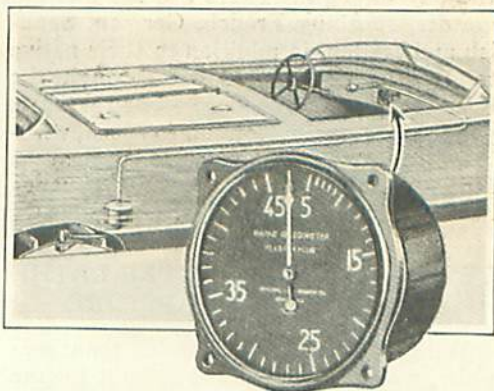
AVERAGE AMERICAN AUTO RUNS SEVEN AND ONE-HALF YEARS

Seven and one-half years are estimated as the average life of automobiles in the United States. This figure is based on department of commerce computations for 1930, and on the knowledge that American drivers use their cars longer in slack business periods. In 1930, the average life of all motor vehicles was 7.36 years, while

for passenger cars it was 7.2 years. During a previous trade slump, the number of scrapped vehicles declined in two successive years, 1920 and 1921, resulting in an increase in the average life of motor vehicles from 5.65 years, at the end of 1919, to 6.63, at the end of 1921. Strange as it may appear, the average life of a motor truck, figured at 9.47 years in 1930, is considerably longer than for all motor vehicles. But depression, instead of resulting in longer use of trucks, actually causes a decline. Thus, it appears from the department's figures that car owners, who normally would add their machines to the total of some 3,000,000 that are scrapped annually because they are a little out of style and shabby, are now keeping them in operation to extract the last few hundred miles of wear that ordinarily would not be utilized.

TRUE SPEED THROUGH WATER SEEN ON SPEEDOMETER

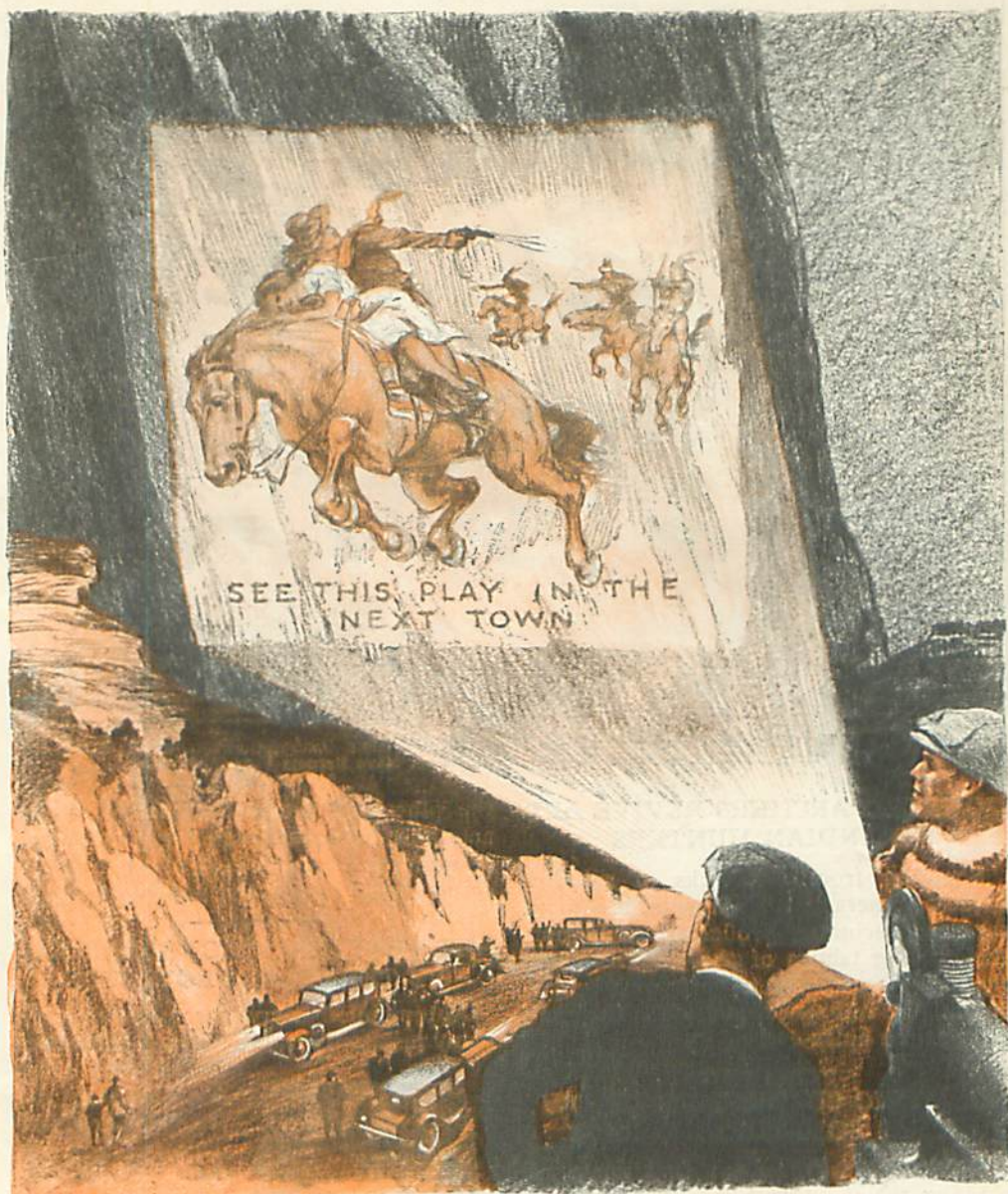
Marine speedometers for inboard boats that show the true speed through the water and have no connection with the motive power, have been developed. The instruments are available in seven models with maximum speeds from thirty to sixty miles per hour. Installation is easy, and all fittings are supplied with the instrument, ready for mounting on the boat's dash. In addition to the inboard type, there is a model for cruisers that shows



Speedometer for Runabouts and Cruisers and. Above, Simple Method of Installing It

not only the speed of the vessel but the number of miles traveled as well.

Sky Movies Flash on Clouds and Mountains



Here Is the Artist's Conception of Sky Movies as They Would Appear When Flashed on Mountainside; the Picture Represents a "Trailer" or Advertising Flash from a Film Thriller in the Next Town

Every cloud and every mountainside would be converted into a motion-picture screen by a projector invented by a Berlin engineer. The apparatus has a range of five miles. On low-hanging clouds 230 feet above the earth, pictures 130 feet high can be flashed, while the distance of the

machine from the mountain determines the size of the figures. Although the apparatus is arranged for showing complete movies, its principal use probably will be for advertising, pictures being projected over cities and on mountains along the route of heavily traveled highways.



Imitating the Indian Hunters of Pioneer American Days, These Archers Discharge Arrows at the Target as Their Horses Dash By; Riders at One Desert Resort Have Become Very Proficient

MOUNTED ARCHERS REVIVE ART OF INDIAN HUNTERS

Shooting from the backs of running horses, archers at a California desert resort are becoming proficient. Adopting the hunting tactics of the early Indians, the archers pass the targets, with horses running at full speed, and loose their arrows at the bull's-eye.

ELECTRIC CURRENT FOR PLOW MAKES SOIL-TURNING EASY

Electricity will reduce fuel costs of plowing when current is applied to the moldboard, that part of the plow which turns the soil. Particles of moist soil are known to be negatively charged with electricity. In the presence of an electric current, water in the soil moves toward the negative electrode while the soil particles are repelled. Thus, with the moldboard as a negative electrode, a film of water is formed where there is contact between

the plow and the soil. This water film acts as a lubricant, reducing friction and resulting in a ten-per-cent saving on power necessary to pull the implement.

AUTO-BATTERY TROUBLE CURED BY TERMINAL PROTECTOR

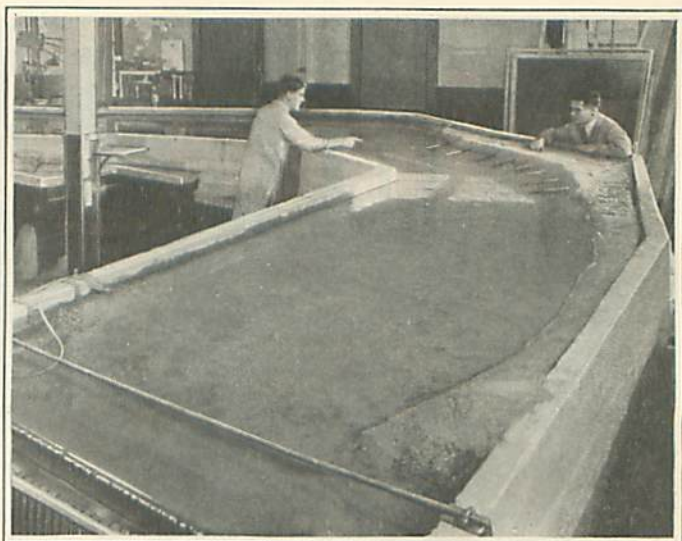
Automobile-battery corrosion, with its many resultant ills, is said to be eliminated



entirely by a device recently developed for installation on any type of car. Battery recharging is saved, many cable and terminal replacements are obviated, battery-post, cover, bolt-and-nut repairs and replacements of radio tubes are reduced. The apparatus is a leather bag fitting over the positive terminal and filled with a non-corrosive compound.

COLOR OF FLAME TELLS ITS HEAT

While a heated solid, such as a bar of iron, quickly tells the initiated eye its approximate temperature by its color, the heat of a flame always has been considered beyond the capacity of the human eye to grade. A flame which appears hot may actually not burn the hand, and the opposite is equally true. Recently, however, the bureau of mines worked out a method to give an accurate gauge of flame heat without resorting to a pyrometer. A sodium scale has been constructed as the result of tests, and by adding sodium to the flame, which turns it yellow, the intensity of the color is made to indicate its temperature.



Laboratory Model of a Section of the Connecticut River, Built to Study the Relation of the Currents to Soil Erosion

LUNCH STAND ON MOTORCYCLE SERVES HOT OR COLD FOOD

One North Carolina man is making a living by operating a portable refreshment stand, his "shop" consisting of a glass-enclosed frame mounted on the supports for a motorcycle sidecar. In cool weather, he sells popcorn, the stand carrying the standard size of burner equipment. When the season changes and ice cream becomes more desirable, he can convert his rolling store to an ice-cream stand.



Popcorn Stand Mounted on a Motorcycle on Sidecar Supports; in Summer, Ice Cream Is Dispensed

MINIATURE RIVER HELPS STUDY OF EROSION AND FLOODS

To discover the cause and remedy of soil erosion resulting from the swirling currents of the Connecticut river, a miniature of the stream was built on a laboratory table at the Massachusetts Institute of Technology. The model represents a section of the river near Northampton, Mass., where the waters for years had steadily devoured agricultural lands. A two-mile stretch of the river was surveyed and reproduced, fifty-five feet long and six inches deep, the model being on a scale of six inches for each 100 feet. Banks and bottom were formed of fine sand, shaped to represent the actual river bed, the flow of water through the channel corresponding to the river at flood stage. Special dyes, bits of drift and mechanical apparatus were used to study the currents and eddies, the model even reproducing at relative places the same sand riffles seen in the Connecticut. Months of research disclosed that the trouble was caused by a corkscrew water spiral lying parallel to the bank, its top side rolling over against the bank and sucking away the soil beneath. It was found that a row of spur-wing dikes projecting from the opposite bank may be used to change the location of the spiral to a place where the soil is firm and resistant to erosion.

White Gold!



By DON BLACK

Darkness Does Not Stop Work on Hoover Dam, For Night Forces Replace Day Workers; Above Is a Night View of the Dam Site

THEY call it the most spectacular sight in America today.

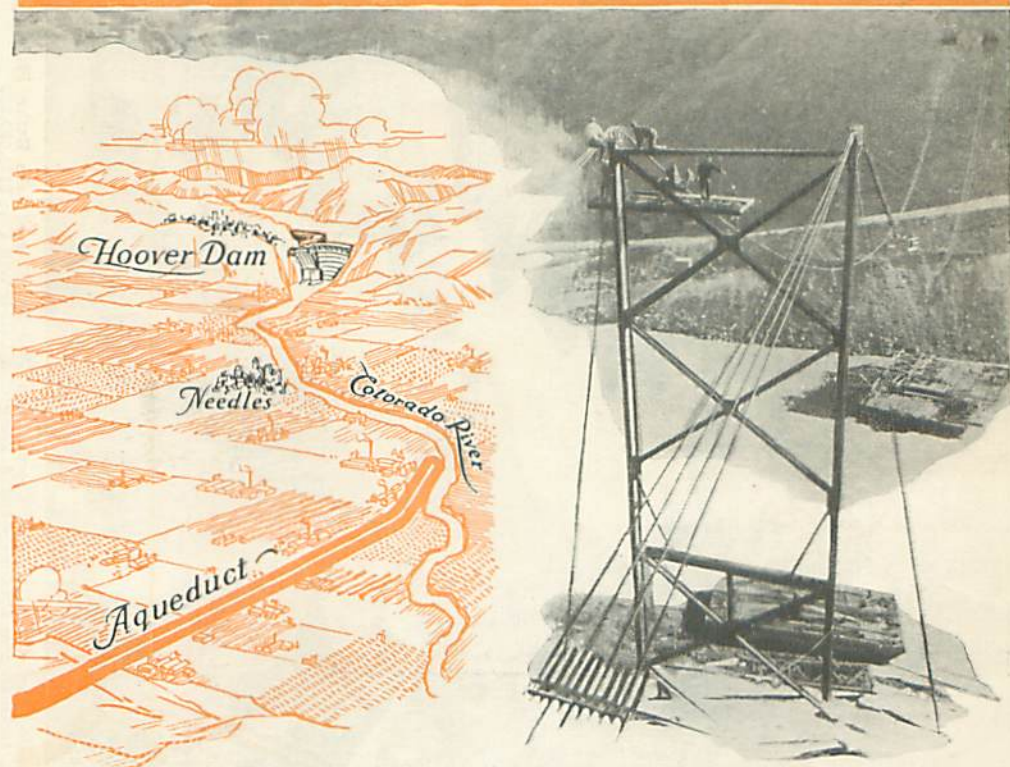
Blackest night above, inferno below; and you, perched halfway between on the brink of this abyss, reaching for the stars to keep from falling.

It is the fiery pit of haunted dreams, aglow with light and colorful reflections that bounce back and forth between the narrow walls like the echo. Dazzling searchlights, groping, restless; headlamps streaming out of nowhere to race on hidden trails and vanish like a dream.

Your ears pick out the hiss of steam, roaring motors, muffled subterranean thunder, the rapid-fire tattoo of air-driven tools, the whir, the swish, the chug of giant scoops bit-



Harnessing a River to Reclaim a Desert



Location of Hoover Dam with Relation to the Aqueduct; Above, Workmen Erecting a Steel Bridge across the Colorado River

ing into earth, the river's rumbling overtones—sounds magnified to satanic proportions as they climb aloft to you some 700 feet above.

And this is the beginning of the Hoover dam—a test of man, machinery and engineering without precedent in all the history of the world. Yonder to the north lies the great basin which will be more than one hundred miles long, and will be the biggest artificial body of water in the world. It will hold enough water to cover the state of Kentucky to a depth of one foot. It is a vast area of rugged mountain peaks hewn to fantastic outlines by erosion, splotted with unbelievable color, cleft by great canyons and sandy washes.

In building the dam, enough material

must be moved to furnish foundations for the homes of 80,000 persons. This will be followed by the placing of upward of 4,200,000 cubic yards of concrete and 35,000,000 pounds of reinforcing steel.

Every miracle that modern science and inventive genius have created has been mustered for this tremendous undertaking, the cost of which has been put at approximately \$165,000,000.

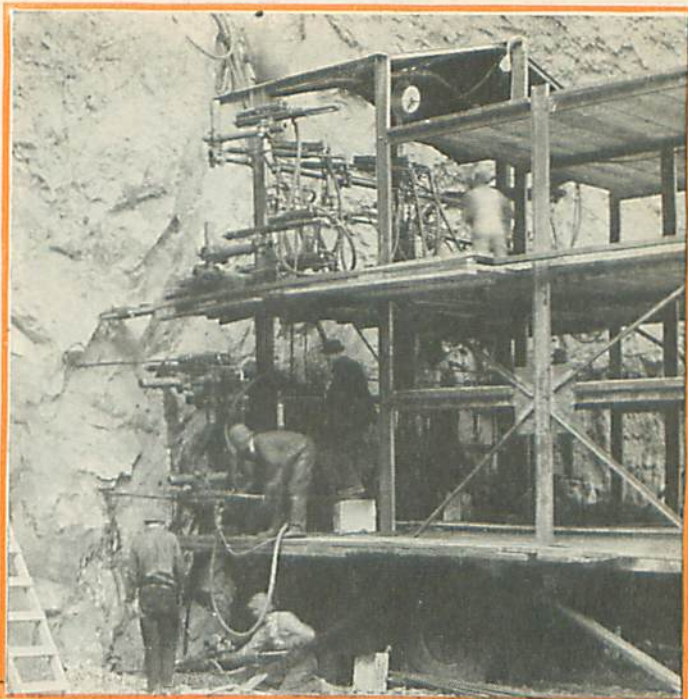
And here, at Hoover dam, are the modern pioneers. Rugged stalwarts all, true sons of the fathers who wrote romantic history at Plymouth rock, in Kentucky wildernesses, along the muddy Missouri, through the golden Feather river rush of '49. No aliens here, by congressional direction, but a picturesque army of native



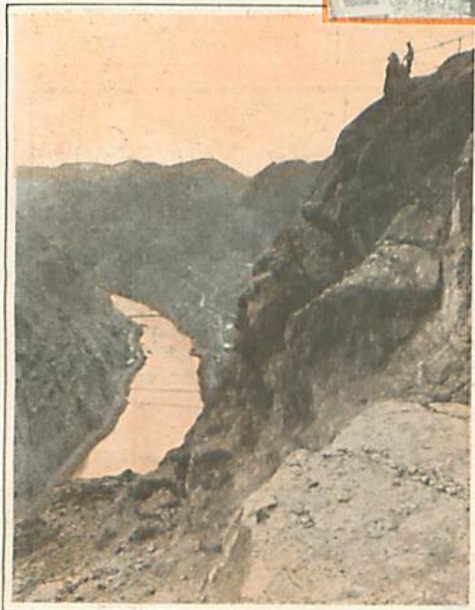
Americans who today as builders of the world's greatest engineering project are reviving in dramatic fashion the traditions and glories of the old west.

There is no more spectacular boom town of record than Boulder City, capital of the new realm. Less than a year ago, nothing but a mirage in the desert sun, a desolate stretch of cactus-strewn, wind-swept hillside. Now a typical, hustling town of 5,200 people, with paved streets, elaborate public-utility systems, fine new buildings, churches, theaters and other good-living facilities.

It materialized magi-



Above, Giant Drill at Work in Boulder-Canyon Tunnel; Left, Lookout Point, 700 Feet above Water



City! It also is the healthiest city, both from the standpoint of climate and sanitation as well as from the angle of personal safety. Weapons are taboo, there are no two-gun bad men, no gangsters, no gambling, no vice.

But on the other hand there is an undeniable swagger about Boulder City; something of the bravado, the high spirit, good nature and devil-may-care attitude of the old cow and mining towns. It's an up-and-coming place, and really resembles nothing so much as a war-time cantonment.

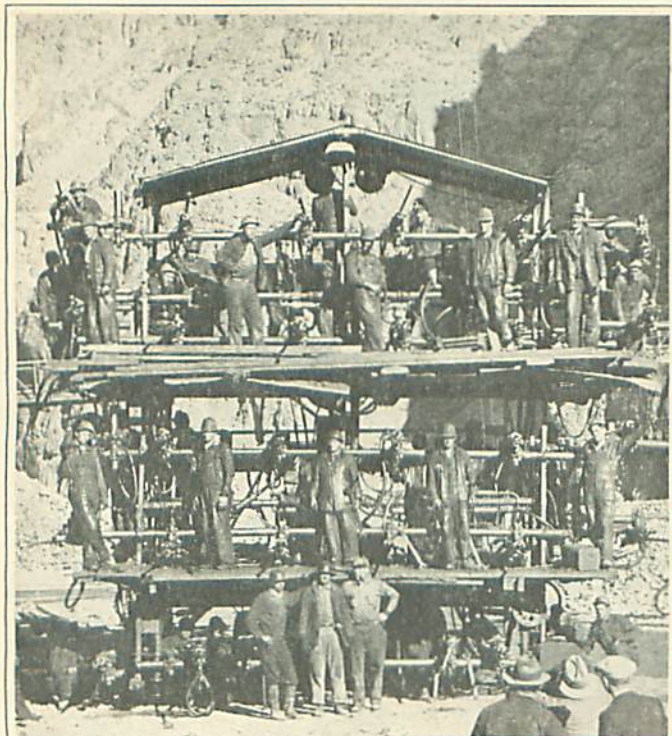
Getting back to the project itself, there are a hundred phases of construction wholly without precedent.

"Hoover dam carries all previous engineering knowledge and experience one step further," according to one authority.

Here are a few of the special problems:

All concrete generates heat during the hydration or drying-out process. In small blocks, this is dissipated naturally. But it would take 250 years for this projected mass to cool unless artificially treated. So they are going to put Hoover dam literal-

cally, overnight. Not helter-skelter, but to exact plan—a city precise to the last detail before a nail was tapped. It unquestionably is the driest community in America. At the reservation entrance all cars and their occupants must pass the inspection of eagle-eyed United States marshals. Try and get a drink in Boulder



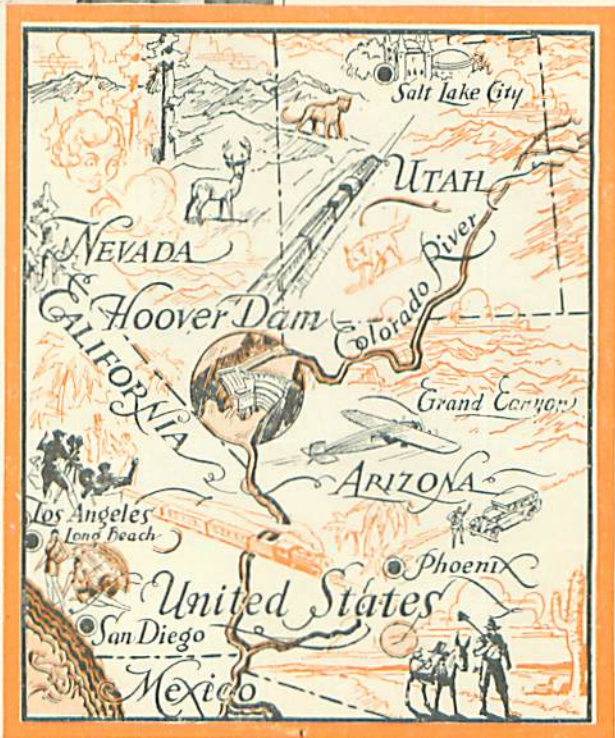
ly "on ice." Some 152 miles of pipe and a complete cold-storage plant will be required for the job.

Then there are the giant diversion tunnels through which the river will flow while the dam itself is under construction. There are four of these, each three-quarters of a mile long and fifty-six feet in diameter. That means the height of a four-story building. Nothing so gigantic in tunneling ever before has been attempted.

One of the most dangerous tasks of the entire project is scaling down of the canyon walls that tower almost a sheer thousand feet above the river. Suspended from above by ropes anchored to steel bars driven into the rock, jackhammer men, riggers and scalers toiled for days on overhanging projections. Huge masses had

to be drilled and blown down with dynamite. Every loose fragment for a mile up and down the river on both sides of the 350-foot gorge had to be cleared for protection of the workmen below.

Never has so great an enterprise been confined and restricted to so small an area. Another handicap to be overcome was, and is, climate. It isn't the humidity here, it's the heat. Only Death valley, the famous California inferno, knows higher temperatures. For more than ninety days last summer, the average daily temperature in this lower Colorado basin was 119.8 degrees Fahrenheit, while on many days the maximum thermometer registered 128 degrees. Al-



Top, Drill at Hoover Dam Which Bores Sixty-Four Holes at Once;
Below, Area Affected by Hoover-Dam Project

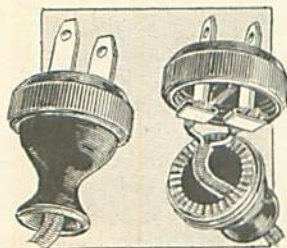
though it is true that 110 degrees of this dry heat is comparable to ninety in New York or Chicago, 128 degrees on any man's thermometer spells capital "H-O-T."

And last, but not least, is the river itself. With a flow velocity of from eight to thirty miles an hour, it is regarded as the world's most dangerous stream. In flash flood it will often rise sixty feet in six hours. This is the only river in the world whose volume is less than half water. Some sixty per cent is sand and gravel in suspension.

"Too thick to drink, too thin to plow"; that's what they say. In forty years the Colorado has pushed back the Gulf of California 150 miles. And here's what it will take to stop that river:

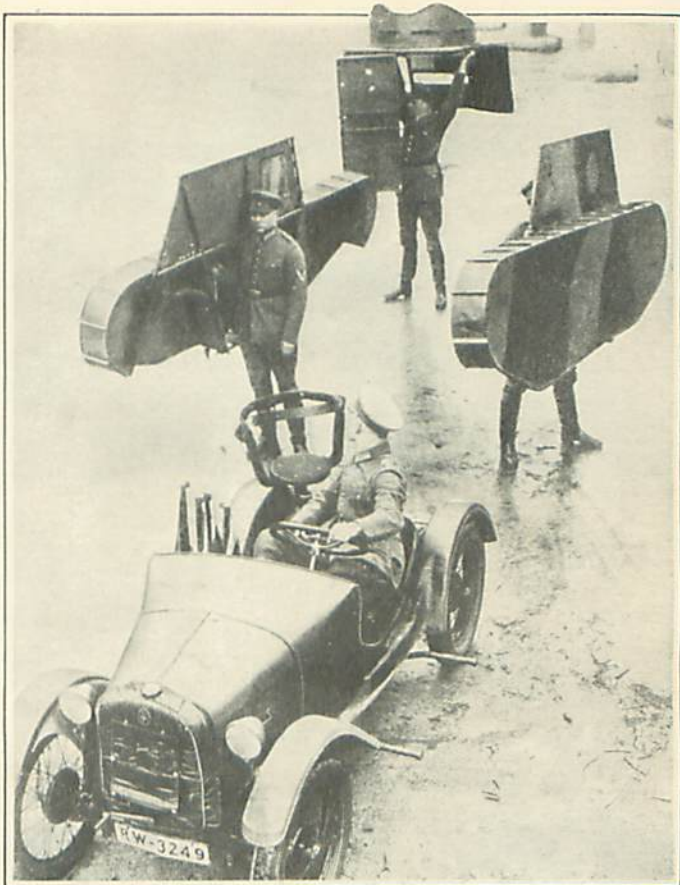
A dam two city blocks thick at the base, tapering to forty-five feet on top; 727 feet, or one-eighth of a mile, high. That's just twice as tall as any other dam on earth. It means enough concrete spread into a twenty-foot highway to reach from Los Angeles to Chicago.

ELECTRIC PLUG CAN BE WIRED WITHOUT TOOLS



screwed together after the bare ends of electric cord are inserted into jaws of two prongs used to make the connection.

Simplicity in assembly is offered in a new electric-current plug that can be wired without tools. The plug consists of two pieces which are



© International News Photo

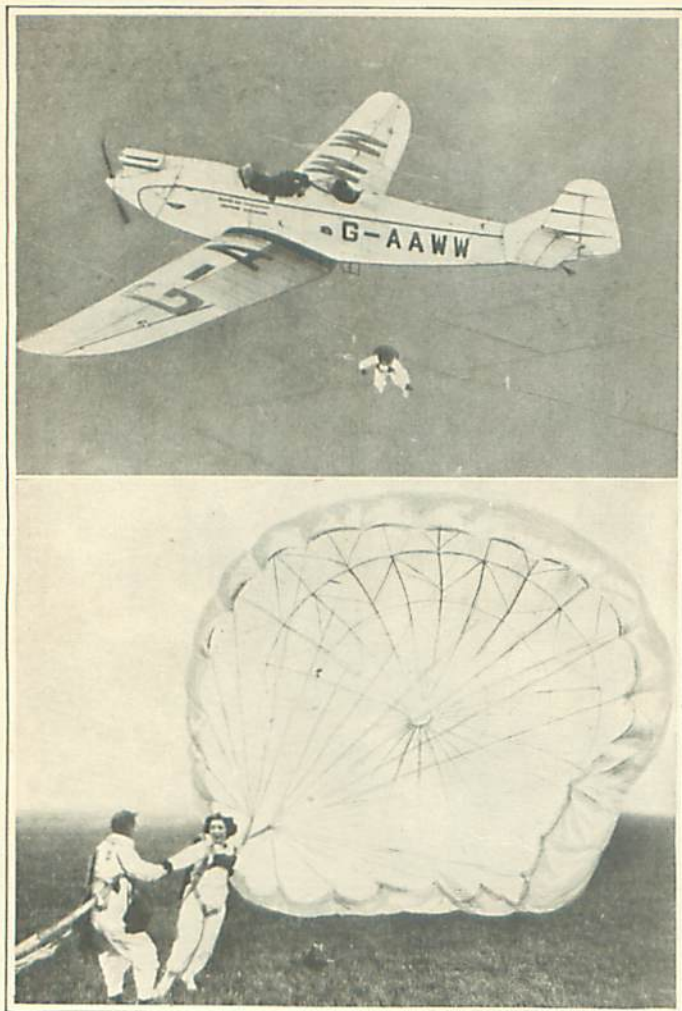
When the German Army Fights Sham Battles, Cardboard-Armored Tanks Go into Action; Note How the "Armor" Is Fitted on Auto Chassis

AUTO WITH CARDBOARD ARMOR IS TANK IN SHAM BATTLES

Armored with cardboard and sheet iron, automobiles that resemble war tanks are used by the German army in their peacetime maneuvers. The papier-mache armament is constructed in sections so that it fits together like pieces of a puzzle.

SUGAR STRENGTHENS MORTAR

Cane sugar has been found to increase the tensile strength of lime and sand mortar about sixty per cent. The discovery was made while tests of sugar as an industrial raw material were conducted at the Mellon institute. The sugar, dissolved in water, is added after the lime has been slaked, five to six pounds of sugar being used for each 100 pounds of lime.



© International News Photo

Top, Picture of Girl Parachute Jumper Snapped by Photographer Who Leaped from Same Ship; Below, Camera Man and Girl after Landing

PHOTO MADE FROM PARACHUTE SHOWS LEAP FROM PLANE

Anxious to obtain an unusual picture, a London news photographer made a parachute drop from an airplane with his camera in order to snap a picture of a girl parachute jumper who leaped at the same time. While falling, the photographer succeeded in focusing his lens on the girl and the resulting picture showed both the plane and the descending parachutist.

☐ Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information.

LOOK FOR DRY ROT WHEN YOU BUY A USED BOAT

If you are thinking of buying a secondhand boat, large or small, a close examination is necessary. There may be hidden defects that only an experienced eye and a rigid inspection can bring to light. For instance, dry rot is hard to find. To detect it, insert a carving knife into the V-shaped space where the planking joins the stem. The wood should be hard and resistant. If any of the wood can be dug out, it is a sure sign of dry rot. Go over the whole boat in the same manner, sticking your knife into or around all closed places and all points where two pieces of wood abut. Another common defect is cracked frames. Look at the seams on the outside of the boat. If one or two seams are two or three times the width of the others, or if there is evidence of an unusual amount of puttying and calking on one seam, a closer examination may reveal a cracked frame. The inside should be in-

spected in a similar manner, tearing away part of any woodwork that may conceal the defect. Of course, you will be expected to pay for such damage. Rusty fastenings also should be tested, leaks should be investigated because they may be the only sign that the boat is falling apart, and the bottom of the keel must be inspected and tested with a knife. Look closely for teredo or worm holes, about the size of a match head. These holes may look insignificant, but the inside of the keel may be entirely hollow. Putty may cover some of these holes, so dig it out. Then, if you aren't sure, employ an expert to examine the boat.

BUTTERFLIES OF JUNGLE BITE AMERICAN EXPLORER

Butterflies that bite like horseflies attacked an American zoologist in the jungles of northeastern Paraguay. Dr. Donald S. Wees, the explorer, in a letter brought out by runner, tells of the biting butterflies, of his party living on yellow worms and braised alligator, of swarms of insects which caused many nights of sleeplessness and of spiderwebs that enmesh birds. Traveling through miles of uninhabited forests that support every form of animal life, Doctor Wees is trying to reach the head waters of the Parana river. His party launched into jungle with a bag of rice, a tin of yerba (mate) and seventeen and one-half pounds of flour, hoping to shoot enough game to sustain life.

TURNTABLE PLATFORM SAVES TRUCK LOADING TIME

Mounted so that it can be turned to make a flat connection with the body of a truck, a loading platform intended to speed up industrial transfer has been introduced. The adjustable platform is semi-circular and moves on rollers. When the truck backs against the platform from any angle, the pressure swings the edge of the platform into alignment with the floor of the truck. This eliminates the usual time-wasting maneuvering of trucks to make proper contact for loading. When the truck pulls away, the platform swings back into normal position.



When This Loading Platform Is Struck by Truck, It Swings Around to Make Close Contact



Replacing the "Sandwich-Board" Man, This Dog Advertises a Theater in the Manner Shown Here

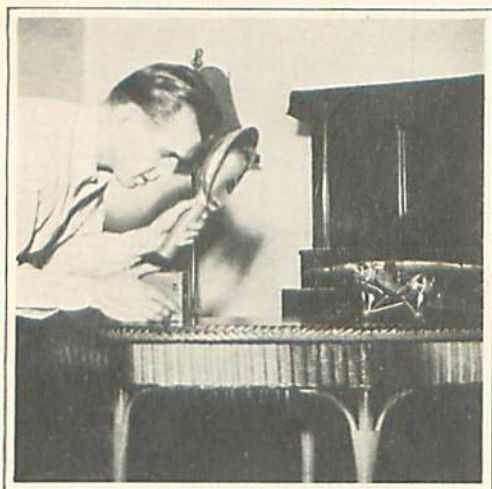
DOG CARRIES ADVERTISING SIGN ON DENVER STREETS

Advertising signs for a Denver theater are carried about the city's streets by a large dog. Trained to stop and look into shop windows so passers-by may have time to read the sign, the dog attracts considerable attention. The sign is arranged so the dog carries it in his mouth, wires supporting the placard above his head.

YOU EAT A THIRD POUND OF MEAT DAILY

One third of a pound of meat daily is the per-capita consumption in the United States, where 16,530,000,000 pounds of meat products were eaten in 1931. This is a yearly consumption of 133.2 pounds per person. Of this fifty-two per cent came from hogs. Beef consumption remained about the same, but lamb, mutton and veal proved more popular in 1931 than in other years.

NIGHT MOVIES EASY TO MAKE BY "CONTINUOUS FLASH"



This Flash Lamp Burns Long Enough to Make 400 Feet of Home Movies at Night

Gas-filled and casting rays of extremely high intensity, a lamp has been developed that lasts long enough to expose 400 feet of home movie film. While its light is similar to the flash bulb, the light in the new lamp will last from fifteen to thirty minutes, and, if used for snapshots, will give light enough for not less than thirty pictures. It has been found particularly effective in indoor photography as well as night snapshot and movie making.

COLD MAKES YOUR AUTO RUN BETTER, NOT HUMIDITY

One more of the motorist's pet beliefs—that an automobile engine delivers more power on a rainy day and runs smoother—has been shattered. The bureau of standards conducted a series of tests and found the exact reverse to be true. It is the temperature, not the humidity, that makes the car hum in the rain. Power may be expected to vary as much as five per cent between the driest and wettest days, but whatever gain there may be in power on a wet day is due to the fact that a rainy day is usually cooler, and power increases with the decrease of temperature. Tests were run under conditions simulating a range in humidity from that to be found in a desert to that of damp tropics, and in

varying temperatures. Since power is proportional to the amount of oxygen an engine can get, horsepower decreases with increase of temperature, with increase of humidity, but gains with decrease of air pressure. On a rainy day the oxygen content of air passing through a carburetor is diminished because part of the air is water vapor. The tests bear out the common belief that a car runs better at night than during a hot day, because power increases in a set proportion to decrease in temperature. In some cases on a rainy day the decrease in power due to increase in humidity is more than balanced by the cooling effect of a storm. One reason for the belief that a car runs better in rain may be the cushioning effect of the water.

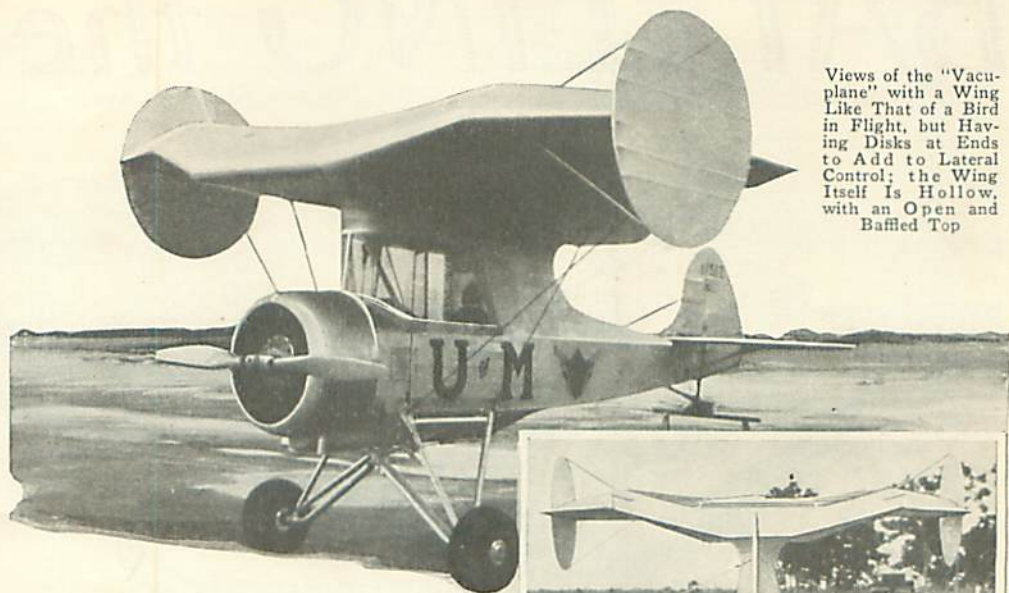
BATTERY-DRIVEN WHEELCHAIR HAS MOTOR AT FRONT

Propelled by a motor operating on current from two automobile storage batteries, a wheelchair that is easier to steer has been placed on the market. The motor is mounted over the front wheel and connected by chain drive to an oil-tight housing containing silent gears. This change from the usual chair with rear motor makes the vehicle more flexible in operation, providing a shorter turning radius and propulsion along a straight line, since the motor pulls the single front wheel instead of pushing one rear wheel. The power plant also contains the brake, which is operated by a small lever on the steering handle. Two storage batteries will run the chair twenty miles on one charge.



Making It Easier for Invalids to Move About, This Wheel Chair Runs Twenty Miles on Battery Charge

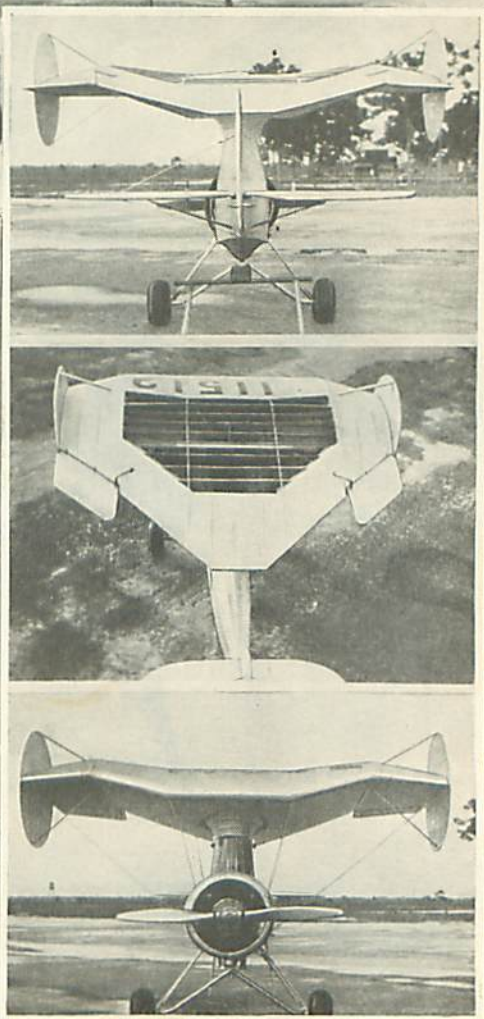
Here Is an Airplane That "Almost Flies Itself"



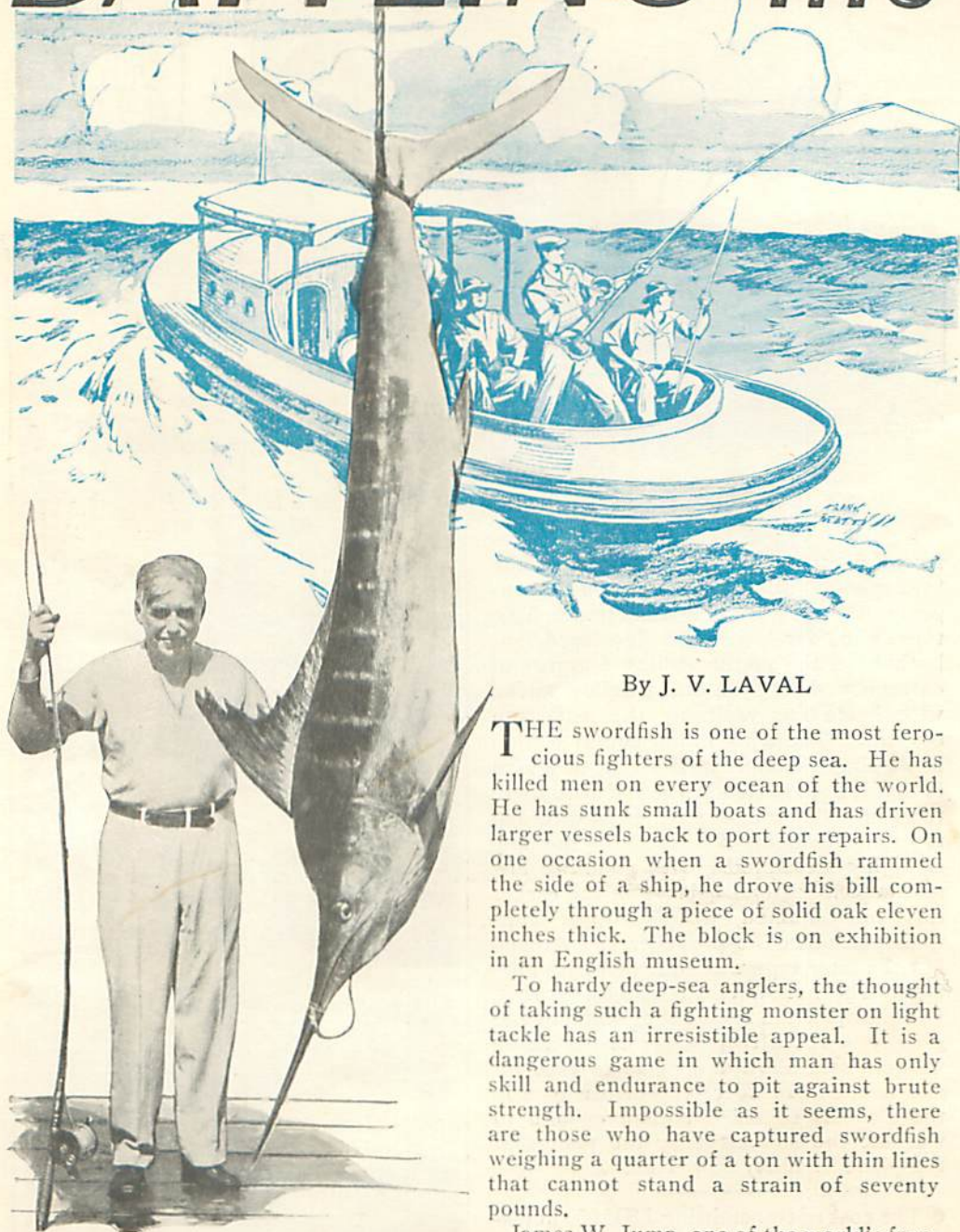
Views of the "Vacuplane" with a Wing Like That of a Bird in Flight, but Having Disks at Ends to Add to Lateral Control; the Wing Itself Is Hollow, with an Open and Baffled Top

Named by its designer, a research professor at the University of Miami, the "vacuplane," an airplane of unusual appearance has been successfully flown. Two types thus far have been developed, but both have the distinguishing features of extremely short span and a hollow airfoil with baffle fins replacing the usual top covering. The wing in horizontal section has a shape something like that of a bird in flight, but is fitted at the end with disks to reduce the wing-tip vortex and to add to lateral control. The cabin of the ship is highly streamlined with resulting low resistance. Lateral balance in the earlier tests was obtained through "flipper" controls placed in the propeller slip stream, but the later type was equipped with ailerons. The hollow character of the wing, with its open and baffled top, is said to add greatly to the lifting power of the airfoil vacuum and allow the plane to take off and land at low speeds. Performance in the air was considered good enough to warrant the statement by the pilot that the plane virtually flew itself.

☛The cost of transmitting 1,000,000 horsepower-hours of electrical energy is \$195 as compared with \$65 for transmitting as much energy in the form of gas.



BATTLING the



By J. V. LAVAL

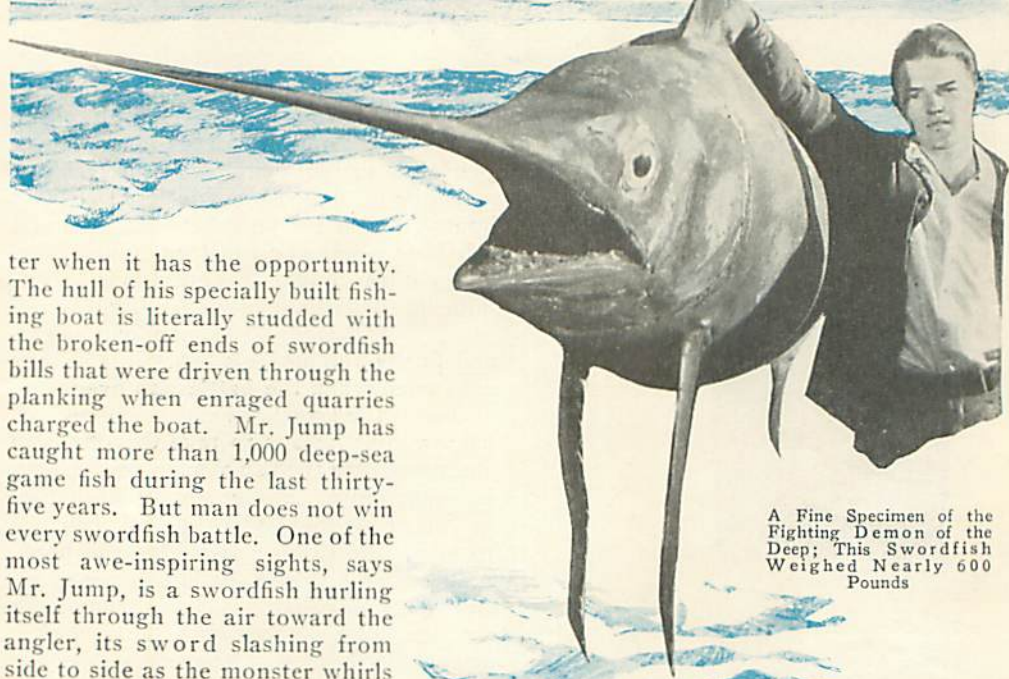
THE swordfish is one of the most ferocious fighters of the deep sea. He has killed men on every ocean of the world. He has sunk small boats and has driven larger vessels back to port for repairs. On one occasion when a swordfish rammed the side of a ship, he drove his bill completely through a piece of solid oak eleven inches thick. The block is on exhibition in an English museum.

To hardy deep-sea anglers, the thought of taking such a fighting monster on light tackle has an irresistible appeal. It is a dangerous game in which man has only skill and endurance to pit against brute strength. Impossible as it seems, there are those who have captured swordfish weighing a quarter of a ton with thin lines that cannot stand a strain of seventy pounds.

James W. Jump, one of the world's foremost game fishermen, has found the swordfish a vicious opponent that gives no quar-

Marlin Swordfish Weighing 215 Pounds Which Was Landed with a Light Tackle at Catalina Island in Fifty-Three Minutes

GLADIATOR *of the* DEEP



A Fine Specimen of the Fighting Demon of the Deep; This Swordfish Weighed Nearly 600 Pounds

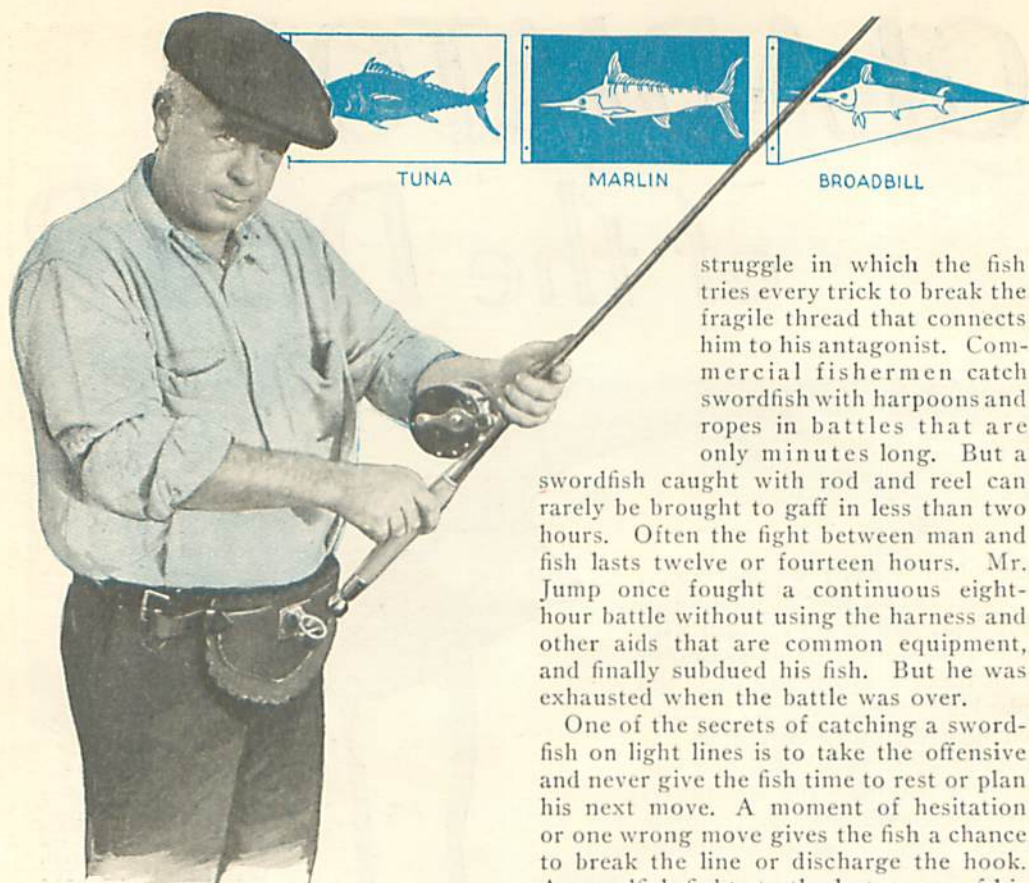
ter when it has the opportunity. The hull of his specially built fishing boat is literally studded with the broken-off ends of swordfish bills that were driven through the planking when enraged quarries charged the boat. Mr. Jump has caught more than 1,000 deep-sea game fish during the last thirty-five years. But man does not win every swordfish battle. One of the most awe-inspiring sights, says Mr. Jump, is a swordfish hurling itself through the air toward the angler, its sword slashing from side to side as the monster whirls its head. Only dexterous maneu-



Preparing a Harpoon for Stalking Swordfish and Sharks Off Lower California

vering of the boat can prevent calamity when a swordfish is on the rampage.

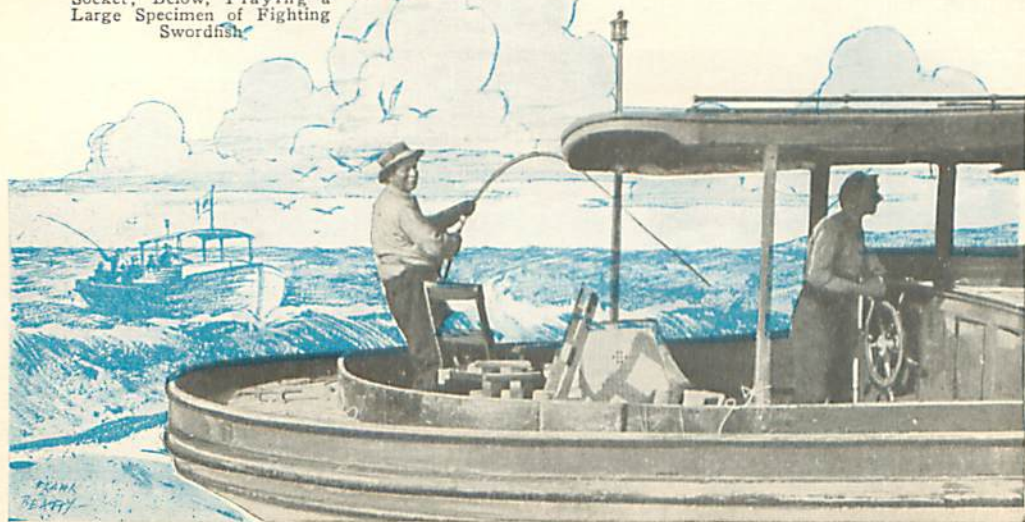
To capture this gladiator of the sea on rod and reel requires skill and courage. Many men have admitted defeat after hours of heartbreaking

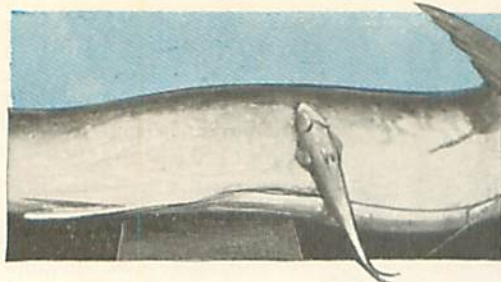


Top, Flags Shown at Mast-heads of Boats to Indicate Catch; Above, How Light Tackle Rod Fits into Belt Socket; Below, Playing a Large Specimen of Fighting Swordfish

struggle in which the fish tries every trick to break the fragile thread that connects him to his antagonist. Commercial fishermen catch swordfish with harpoons and ropes in battles that are only minutes long. But a swordfish caught with rod and reel can rarely be brought to gaff in less than two hours. Often the fight between man and fish lasts twelve or fourteen hours. Mr. Jump once fought a continuous eight-hour battle without using the harness and other aids that are common equipment, and finally subdued his fish. But he was exhausted when the battle was over.

One of the secrets of catching a swordfish on light lines is to take the offensive and never give the fish time to rest or plan his next move. A moment of hesitation or one wrong move gives the fish a chance to break the line or discharge the hook. A swordfish fights to the last ounce of his strength. Spectacular leaps through the air are interspersed with long dashes across the surface of the ocean, the fish





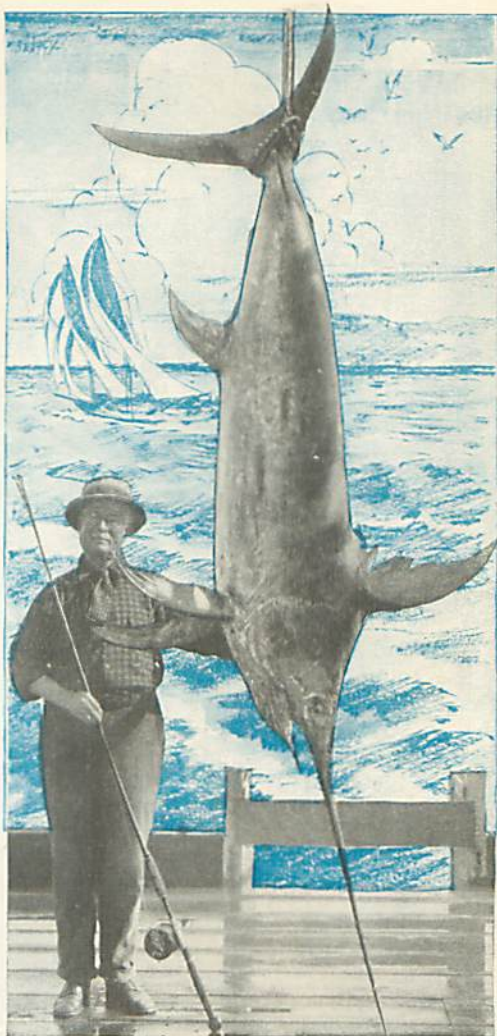
Above, Sucker Parasite Attached to Swordfish; Right, a 365-Pound Fish Caught with Light Tackle

going so fast that the line can hardly whip off the reel fast enough. The deep-sea angler is under a constant mental strain that is worse than physical pain.

"Small boats venture out more than fifty miles from shore in search of swordfish," says Mr. Jump. "The angler trails his bait—a flying fish or a small barracuda—behind the boat. When the dark dorsal and tail fins of a swordfish are sighted on the surface, the course of the boat is changed to pass in front of the fish. Sometimes the swordfish is not attracted by the bait, but if he does attack, there is an upheaval of foaming water, and the bait and line are catapulted into the air. The swordfish may strike the bait several times broadside with his bill before he takes it. A swordfish uses his weapon most for slashing, not spearing.

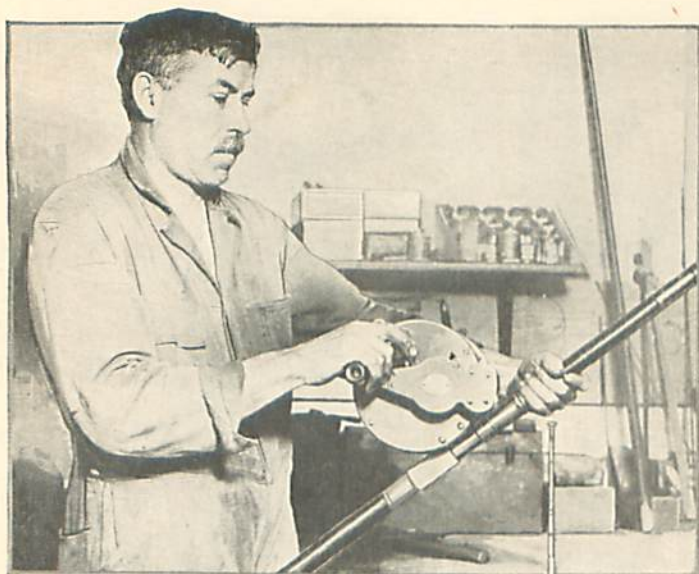
"The moment of the strike is critical, for if you are not securely braced, you stand a good chance of being pulled overboard. Imagine the furious charging and desperate maneuvering of a trout in a fish that weighs hundreds of pounds, and you have some conception of what you are up against. It is really a two-man job, for the boatman has just as much to do as the angler. The boatman must follow the fish to ease the strain or swerve the boat at the last minute to escape a charge of the infuriated game.

"A hooked swordfish may leap out of the water hundreds of times trying to dislodge the hook by slashing at the wire leader. Then he falls back into the water with a tremendous splash. Or he may streak across the water at express-train speed and suddenly turn to come charging down on the boat. Sometimes a fish runs more than a thousand feet before chang-



ing his course. Small skiffs have been dragged over the water for hours by swordfish."

Sportsmen have limited the strength of the tackle that is used for taking the big fish in order that the skill of the angler may be tested to the utmost. The Tuna club, on Catalina island, near Los Angeles, has standard specifications for tackle that are generally accepted by deep-sea anglers. Heavy tackle consists of a line that has a breaking strain of not more than sixty-six pounds, with a wooden rod that must be not less than five feet long and must weigh not more than sixteen ounces, exclusive of the tip. With this frail gear a broadbill swordfish weighing 573 pounds



Above, Tightening Brake on a Reel; Right, Completing a Heavy Tackle Rod

was taken last year. Light tackle is even more severe on the angler, the rules demanding that the line break when given a strain of twenty-six pounds. The light-tackle rod must weigh not more than six ounces, exclusive of the butt. Beyond this classification there is the final grade known as the "three-six," with which only the most experienced anglers attempt to capture swordfish. Three-six allows the fisherman a line that breaks at sixteen pounds. With this he must use a rod that is not shorter than six feet, including the butt. The entire rod must not weigh more than six ounces.

Mr. Jump holds three world records for the light-tackle class, having caught with this frail outfit a 365-pound broadbill swordfish, a 345-pound marlin swordfish, and a 145½-pound tuna. He also holds a world record with the three-six, having landed a fifty-seven pound tuna with it. Only three broadbill swordfish have ever been taken with the three-six tackle, and Mr. Jump captured all three. Many heavier swordfish than these have been caught, of course, but with tackle

having many times the strength. Some swordfish in Honolulu waters attain a weight of 1,500 pounds, but these are caught with thick hand lines and much stronger rods.

The rods and reels that are used by swordfishermen are works of art. Some swordfishing outfits cost as much as \$1,200. Although hickory and bamboo are the most popular woods, rod makers go to great lengths to provide strong yet pliable staffs that are light enough to meet the requirements. Among the best is a laminated rod

made of Brazilian pi wood. Such a rod consists of six long segments, cut from the same staff and then glued together again. A five-foot rod of this material can be bent tip to butt without breaking or warping out of shape. Double-skin bamboo rods are made by gluing strips of bamboo over the surface of a thin interior bamboo rod. Another type consists of two longitudinal half rods glued together, one part being hickory and the other black palm. The rod is held so that the hickory is uppermost, the principle being that the black palm will compress under tension and that the hickory will stretch. The action of the different forces is such that the rod whips back into shape when the strain is removed.

Quite small reels are used with light tackle, but for heavy tackle the reels are huge affairs that hold 1,500 feet of line. The larger ones are usually made of duraluminum to keep down the weight.

Each reel has a brake—not the usual leather thumb stall that is pressed against the line—but a mechanical friction brake that may be adjusted with a turn of the wrist to give exactly as much

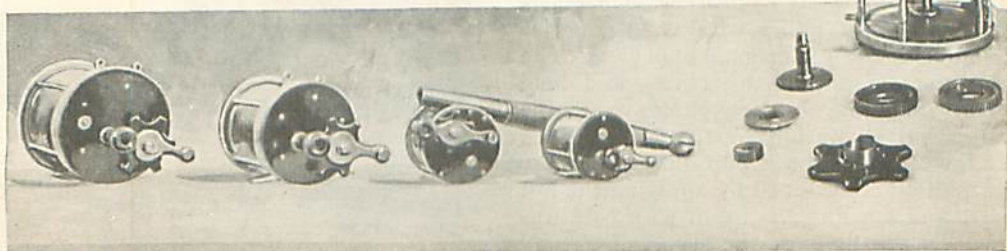




Eight Big Swordfish Representing One Day's Catch by These Deep-Sea Anglers; Landing Even One Such Fish after an All Day Battle Is Considered No Mean Accomplishment

drag as the angler considers the line will stand. The proper use of the brake is of great importance in bringing a swordfish to gaff. Drag is applied whenever the fish begins to move away, but as the distance becomes greater, the drag must be lessened to prevent breaking the line. When the fish turns, the brake is loosened and the slackening line is taken up. The handle of the reel is geared so that one turn of the hand reels in three and a half feet of line. Even with this advantage, the angler can hardly take in line fast enough when the swordfish returns toward the boat at full speed.

A fisherman using heavy tackle rests the butt of his rod in a socket in the swivel chair in which he sits, at the stern of the fishing boat. Around his shoulders is fastened a harness that is strapped to the reel, by which he can apply powerful leverage to the rod. Fishing with light tackle, the angler rests the rod in a socket of a heavy belt. Few fishermen can withstand the terrific pulls and wrenches of a swordfish without these aids. Broadbill and marlin are both found off southern California.



Various Kinds and Sizes of Reels and Parts of the Clutch-Type Brake Used for Big Fish



Worth Almost Twice as Much as Gold, Pansy Seed
Must Be Weighed Carefully

SEED WORTH MORE THAN GOLD PRODUCES PANSY

Seed which produces the ordinary pansy is more costly than gold. One pound of the seed sells for \$640, while a pound of gold is worth only \$330.72. However, one pound of pansy seed will produce 160,000 plants, according to nurserymen.

TEETH EXTRACTED WITH HEAT BY NAVAJO INDIANS

When a Navajo Indian has a toothache, he goes to the medicine man who blasts out the painful molar with a red-hot wire if an extraction is deemed expedient. The wire is inserted in the cavity and held there until the tooth explodes from the abnormal expansion of the bone tissue. If the tooth does not pop out readily, the extraction is hastened by applying the hot wire and dousing the tooth with cold water. To relieve pain, the leaves of a small peppergrass-type of plant are pounded in-

to a paste and applied to the cavity. When the herb loses its power to overcome the pain, and decay continues, extraction with the hot wire is resorted to.

TRUCK PULLS SELF UP A PEAK BY POWER WINDLASS

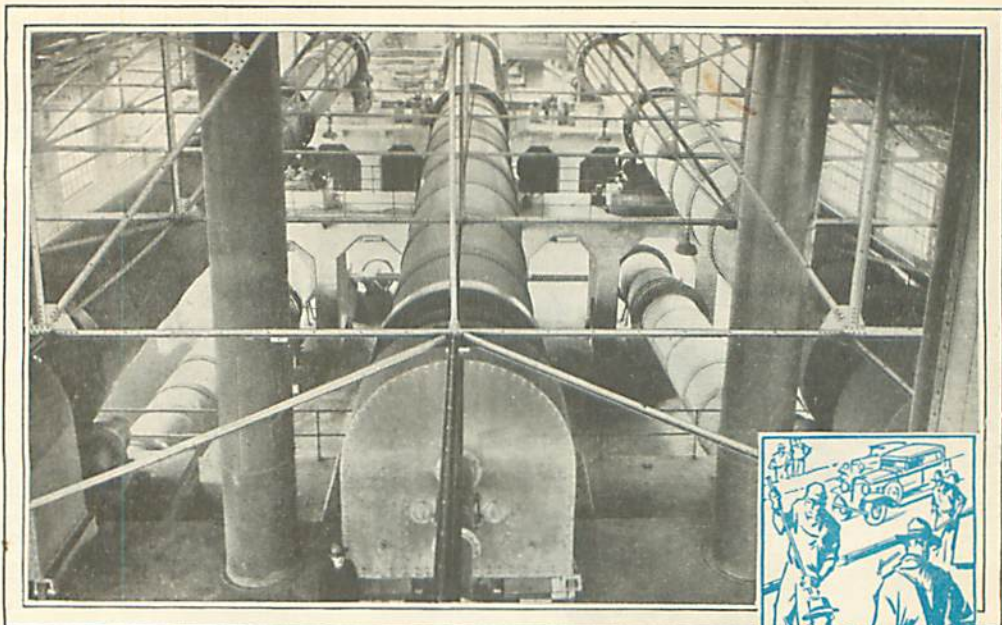
How a seemingly impossible situation was met by engineering skill and resource developed recently in the establishment of airway beacons across the United States from San Diego eastward. Mt. Miguel, a precipitous peak of the sugarloaf variety, required a light, but there was no road up the mountain over which to haul supplies, and to build a spiral one was too costly. A San Diego utilities concern solved the difficulty by anchoring a cable to the tip of the peak, attaching it to a truck equipped with a power windlass on the rear, and making the truck back its way up the steep sides by winding up the cable. The descent was effected in the reverse manner after the supplies had been landed.

LENSES THAT YOU CAN'T BREAK SAVE EYES FROM INJURY

Non-breakable lenses for eyeglasses have been developed by a Chicago eye specialist, through a secret process. The non-breakable lens looks the same and possesses exactly the same vision-correcting ability as the ordinary breakable eyeglass, but protects the eye from any possibility of injury from flying slivers. Safety glass for automobiles started the inventor on his researches. His lenses may even be pounded with hammers or dropped from great heights without being damaged.



Pounding with a Hammer Has No Effect on These
Unbreakable Eyeglass Lenses



High-Speed Cements

By WILLIAM ATHERTON DUPUY

IT used to be that cement, when mixed with the rough material and doused with the water that converted it into concrete, had to wait twenty-eight days to get its strength. It would set in a short time, but chemistry had to play its part in the hardening that went on slowly within it before it could carry heavy loads.

Now science has waved its wand and, lo, in a single day concrete's back is up to bear the full burdens of maturity. The result is that in those uses where the time element is important, cement, with its greatly increased speed in action, is less of a strain on the patience of those who use it. The kilns and coolers of a plant for making this quick-hardening cement are shown above.

Take the case of the contractor, for example, who was a month behind on an engagement he had to build a 100-foot-arch concrete bridge over Brindley creek,

down in Alabama, with the rainy season coming on. Under his specifications, with the use of ordinary cement, days had to be allowed for the curing of the concrete in the main span before he could go ahead with the rest of the structure.

Instead of doing so he used some of the new early-high-strength cement that has recently come on the market, waited two days and went ahead with more than three weeks saved.

In England, nearly a century and a half ago, a man named Aspdin mixed lime from the chalk cliffs of Dover with Medway mud, which was clay, and got a very superior cement. This clay, it developed, contained silica and alumina in just the right proportions for the mix. He called his product Portland cement because it looked like Portland stone, a familiar building material.

During the war, a faster-acting cement



with a high alumina content was made and used as a base on which large guns were set. After the war, the problem of quickening the action of cements was taken up aggressively, and a number of them have been developed. The Portland-cement manufacturers have improved the detail of making their product to speed it up.

A finer grinding of the materials that go into cement accelerates its action. A more careful selection of materials helps. Much depends on the burning. One of the most important elements in the preparation of the most widely used of the new cements is the fact that the materials composing it are burned twice instead of once. The result is a cement that gets its strength within twenty-four hours after it is used. The ad-

ditional grinding and burning is expensive, of course, and so the new product costs about one-fourth more than ordinary Portland cement.

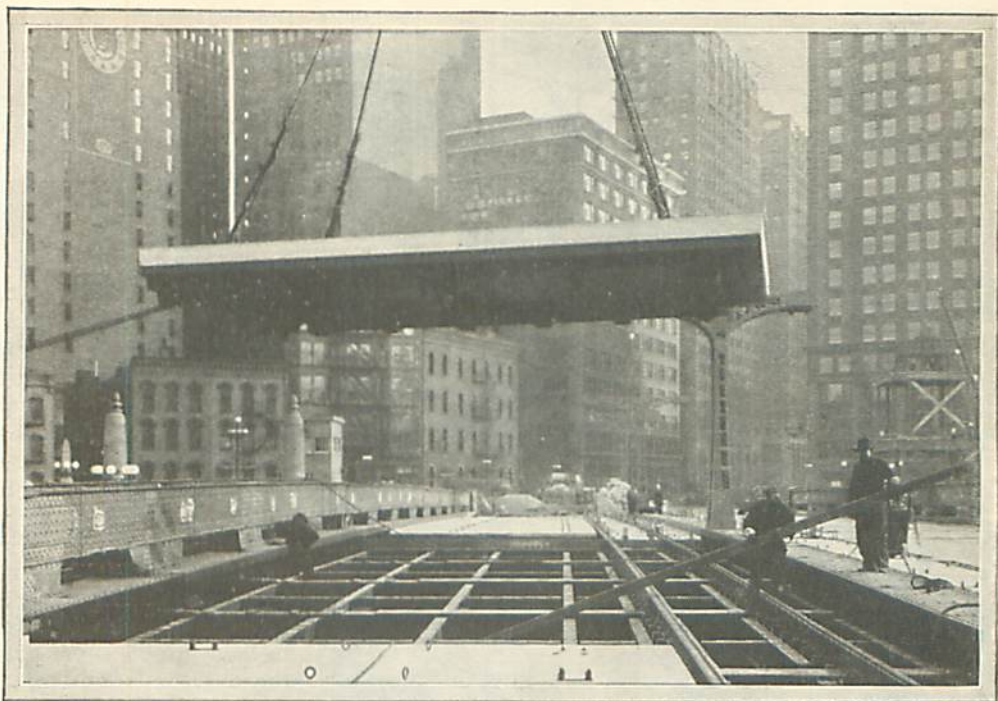
Now, let us take a look at some of the specialized uses of these new cements. At the interurban freight terminal at Kentucky avenue, in Indianapolis, so much business was handled that the old wooden platforms wore out. The railway company wanted to put in new platforms of concrete, but knew that it usually was necessary to wait a week or two for such structures to harden, and so hesitated. After the new cement came in, a contractor signed on the dotted line that he would

take hold Saturday noon and guarantee to have a platform ready for early Monday morning business. By paying a bit of a premium for quick-acting cement, he was able to do so.

In Fort Wayne, also in Indiana, an electric-light company uses concrete poles and made them itself.



Top, Traffic on Concrete Road a Day Old; Center, Cement Pole Made in a Day; Below, Quick-Acting Cement Saved Three Weeks in Constructing This Bridge



The Quick-Hardening Cement, Plus a Steam Treatment, Made It Possible to Get Two of These Bridge-Floor Slabs a Day Out of the Forms in Which They Were Being Made

It had but six forms into which to pour the concrete and, with ordinary cement, it took three days for them to get strong enough to handle. Thus it could produce poles at the rate of two a day. The need for poles grew suddenly, but instead of increasing the size of its plant the company used the new cement and each form turned out a pole every day. This multiplied the production of the six forms by three which sufficed to meet the requirements.

J. R. Hunter, of Decatur, Ala., had a two-car garage at his home to which he wanted to build a paved driveway. If he used Portland cement, he found he would have to wait five days before it would be hard enough to bear the weight of his cars. He solved his problem by putting them away early Saturday, laying a drive of concrete concocted of early-high-strength cement, and it was hard enough for him to drive out to church Sunday morning.

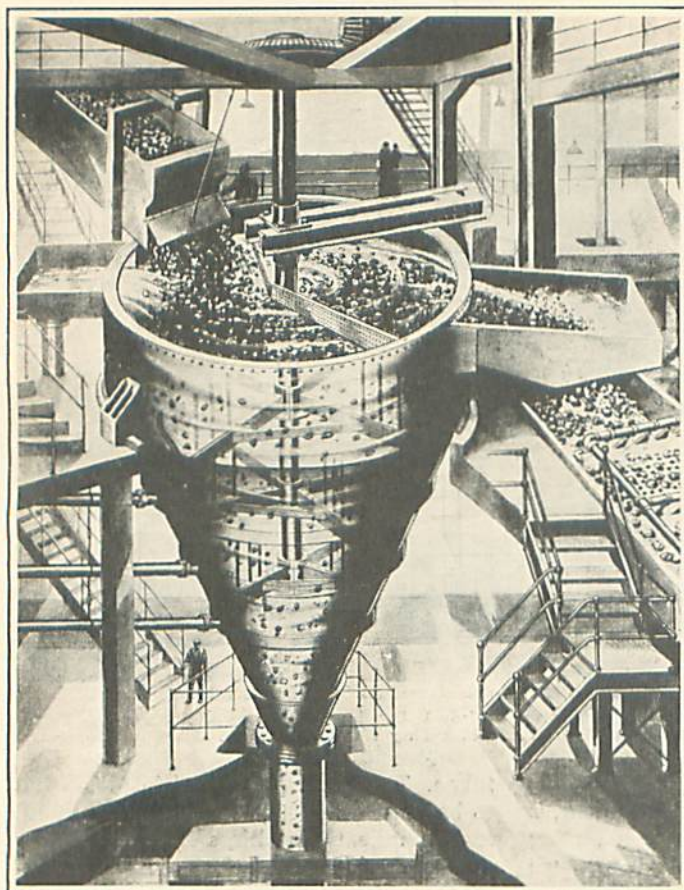
A federal-aid road was being built through the mountains back of Greenville, N. C. Detours were long and consequently inconvenient, so the task of building the road, and at the same time allowing 3,000 cars a day to get through, was under-

taken. To do this, the road in places had to be built in half widths. This was much less complicated and less expensive to the contractor if he used the quick-acting cement, laid one-half of the road on one day as far as he could go, put the traffic on it the next day and laid the other half.

F. H. Jackson, the cement expert of the United States bureau of public roads, says that the use of the more expensive cement is often justified in such instances as this. He recalls, too, such emergencies as that at Harrisburg, Pa., where the traffic pours into a bottle neck as it approaches the bridge over the Susquehanna. That bit of road had to be paved. Hurry warranted expenditure for quick-strength cement.

DIRT-RESISTING DRY CLEANER PROTECTS GARMENTS

Clothing and cloth materials can be made dirt-resisting by a new system of dry-cleaning. A piece of silk cleaned by this process did not absorb ink in a recent test. The ink remained on the surface like mercury and was removed by a suction dropper. The silk was left clean.



Cone-Shaped Agitator for Cleaning Coal by Flotation Process; the Cone Contains Sand and Water in Which the Coal Floats

REVOLVING CONE CLEANS COAL BY FLOTATION PROCESS

One of the latest methods of cleaning anthracite coal utilizes a flotation process. A giant cone-shaped hopper is filled with a mixture of sand and water and the freshly mined coal is dumped into the hopper, the contents being agitated as the cone revolves. Because of its lower specific gravity, the coal floats in the solution while slate sinks and is drawn off at intervals. Both the sand and water are reclaimed and used repeatedly.

MAN TRAVELS FAST AS BULLET IN SPEEDIEST PLANE

Man is able to travel today with the speed of a bullet. When Flight Lieutenant Stainforth of the British navy, winner of

the 1931 Schneider Trophy race, made a speed for the first lap of 415.2 miles an hour, he actually went faster than the maximum speed of a bullet from a British service revolver. This bullet has a muzzle velocity of 600 feet a second, or 409.09 miles an hour. Therefore, if a revolver were fired just as the flyer passed, in theory the bullet might be expected to travel along beside the ship, and the flyer might feel safe in reaching out and touching it, or even putting it in his pocket while it was still proceeding at full speed. The flyer's speed might also be said to have been faster than the average speed of a Springfield rifle bullet. Such a missile leaves the muzzle at 2,653 feet a second, equal to 1,808.9 miles an hour, and its average speed over its effective range of 1,000 yards is 1,270 miles an hour. However, after the bullet has covered its effective

range, it floats on and on, until, slowed down by air resistance, it drops to the ground spent. At the end of its flight, it has very little speed, and if the average is taken, it is found to be less than for the plane at top speed. The bullet would win, however, if the plane's speed were averaged in the same way. The longest range to which a service-rifle bullet can be made to go by elevating the muzzle is 5,600 yards. Its average speed for this distance is 331.4 miles an hour. If a plane were receding at a rate of 415 miles an hour and a rifle bullet were fired from a distance of 500 yards, the bullet would overtake the ship in less than a second. A bullet from a United States army pistol leaves the muzzle at 545.4 miles an hour, or 800 feet a second, and would never catch up with the plane if the ship had a start of more than fifty yards.

RUST-PROOF PAINT IS MADE FROM OXIDE ORE

Resistant to rust, discoloration, corrosion and electrolysis, a recently discovered ore, called "mabelite," has been found practical as a pigment for paints that will protect metals. Such paints form a seal through which few, if any, of the disintegrating elements can penetrate. A general assay of the ore shows the presence of about thirty per cent iron oxide and sixty-six per cent opaline silica. To the naked eye, it appears very much like red sandstone. Iron in the ore has been oxidized to the point of pure rust, making it immune to further chemical action and electric conductivity.

GRINDER MOUNTED ON BICYCLE IS OPERATED BY PEDALS

By mounting a grindstone just above the handlebars, one man has turned his bicycle into a knife and scissors grinder. The stone is turned by the pedals.



When the Bicycle Is Held by Stand at Rear, Pedaling Turns the Grindstone



Some Toys Sawed from Wood by the Boy Who Turned His Hobby into a Business to Pay for His Education

TOYS MADE FROM WOOD PILE PAY FOR EDUCATION

Toys made of material from his father's wood pile have paid, and are paying, for one boy's education. Now 19 years old, Fred Blatchford, of Salem, Ore., turned his childish bent for sawing into profit. Now he has equipment valued at several hundred dollars, all earned by turning out and painting wooden toys. The boy bought his saw, sanding machine, lathe, paint sprayer and compressor, electric fan and motor and jig saw with his own money, while supporting himself through grammar and high-school days. His toys have found ready sale in city stores, some buyers purchasing exclusive rights to handle his products. To his care in finishing the toys, young Blatchford attributes much of his success. Each article gets from ten to twelve coats of enamel and is sanded between each application so that the finished toy is smooth. Waste materials were used by the boy.

LEMON-LIME A NEW FRUIT

By crossing the Mexican lime and the lemon, a new citrus fruit that resists several diseases common to the lemon has been developed in Florida. The fruit looks and tastes like a lemon. Several trees bearing the new fruit are growing at an agricultural station near Miami.



Keyboard of This Piano Shows Stops and Pedals by Which Deep Tones Resembling an Organ's Are Produced

PIANO PRODUCES ORGAN TONES BY RADIO AMPLIFICATION

Electrical vibrations and radio amplification have been adapted to the piano, resulting in an instrument which has the volume of an organ. The player is able to imitate almost exactly every established instrument in the modern orchestra by operating a tone-control knob, a switch that allows quick change from piano note to a sustained organlike note, and a dozen stops that make possible a combination of tones. When the piano keys are touched, the vibrations of the strings when struck by the hammers are communicated electrically to the radio amplifier, instead of being emitted by the soundboard. Only one pedal is provided, which has the effect of the swell pedal on the organ. Amplification of the piano tones enables the player to sustain the prominence of his instrument in the orchestra.

FINGERPRINT USED IN BUSINESS TO IDENTIFY PATRONS

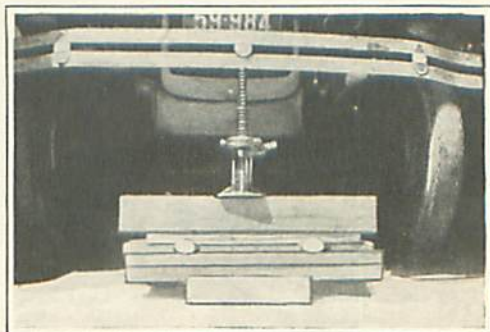
Long associated with crime and with the tracing of underworld characters, fingerprinting is being adopted by govern-

ment and private business as a means of identifying and protecting patrons. While this method of identification has been used by federal and state civil-service commissions for a long time, only recently have banks found it useful in protecting the accounts of their patrons. The United States post office also requires the fingerprints of depositors, in order that withdrawals may be made at any point by comparison with prints taken from the individual receiving the money. This system, of course, protects the depositor as well as the bank. State governments are adopting the plan as an aid in issuing licenses to automobile owners and chauffeurs. Hospitals find it useful in keeping separate the identities of newborn babies, while estates often can be settled if fingerprints are available. Many persons found dead in the streets of large cities

are identified by their fingerprints, taken by some governmental agency. So useful has the method become that officials favor the fingerprinting of every citizen.

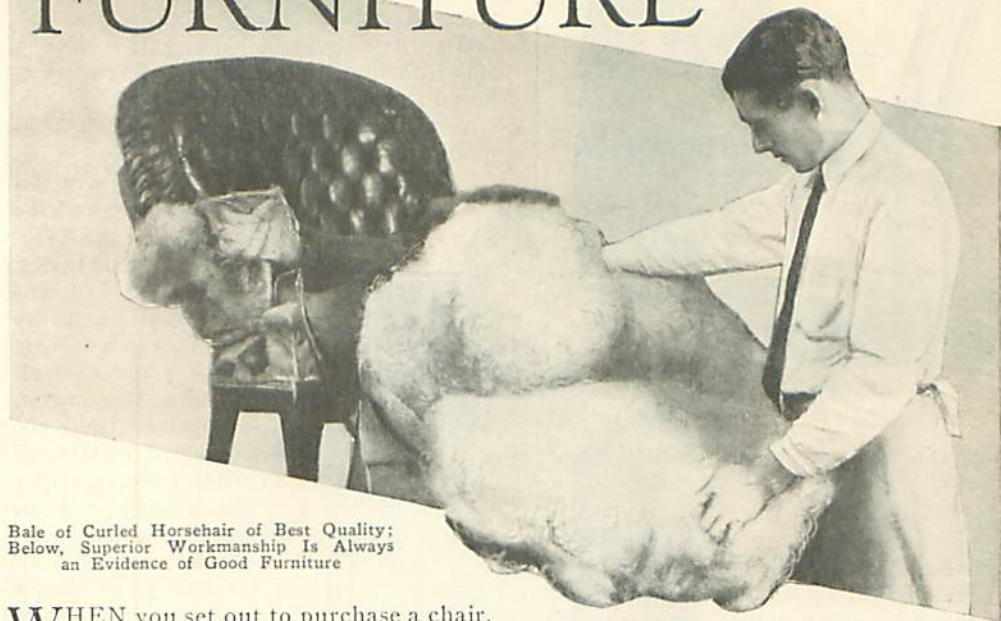
STRONG BOX FOR MAILING EGGS IS MADE OF PAPER

Strong enough to support weights of more than one ton, a paper box for carrying eggs safely by mail is now in use. The container weighs only twelve ounces and holds two dozen eggs. Two of the boxes, in a test, supported an automobile weighing 2,800 pounds.



Weight of Auto Will Not Crush This Paper Box for Shipping Eggs

What You Should Know About FURNITURE



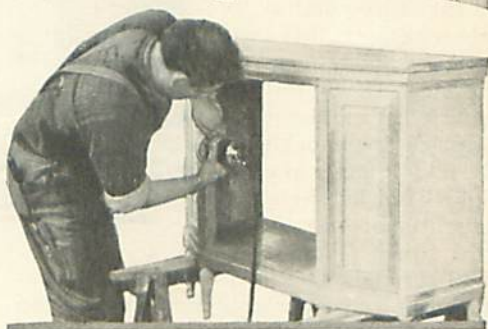
Bale of Curled Horsehair of Best Quality;
Below, Superior Workmanship Is Always
an Evidence of Good Furniture

WHEN you set out to purchase a chair, dining-room set or bedroom suite, what do you really have in mind?

Do you merely wish to obtain furniture which is the last word in style, or do you make a real effort to familiarize yourself with the "whiches," "whens" and "what-somevers" of real value?

When you buy furniture there are a few practical pointers to bear in mind. Remember that the wearing qualities of modern furniture is hidden under the upholstery. But by turning chairs upside down for careful examination and by removing the drawers from tables, cabinets, buffets and similar pieces, you can gain definite insight into how well they are made and the materials used.

Such tests are not suggested in order that you may question the integrity of the furniture manufacturer or retail dealer. The average reputable dealer will welcome them. They indicate forthwith that he is dealing with a person who knows much more about furniture than the ordinary buyer. It is easier to sell to an educated customer who knows what he wants than to one who is uninformed.



Pieces of furniture whose bottoms show many splinters, are rough and unpainted, are specimens of inferior workmanship and finish. Where many nails are visible in the frame of the chair, table, dresser or buffet, they may be recognized as earmarks of imperfect fragile construction. Loose drawers in new furniture are sure to rattle. Test the bottom drawer by removing and standing on it. If it will not support your weight, do not buy the piece at any price. A good drawer is invariably dovetailed at both front and back and is provided with center or side slides on the



underside. You produce a perfect example of dovetailing by linking together the knuckles of your two hands.

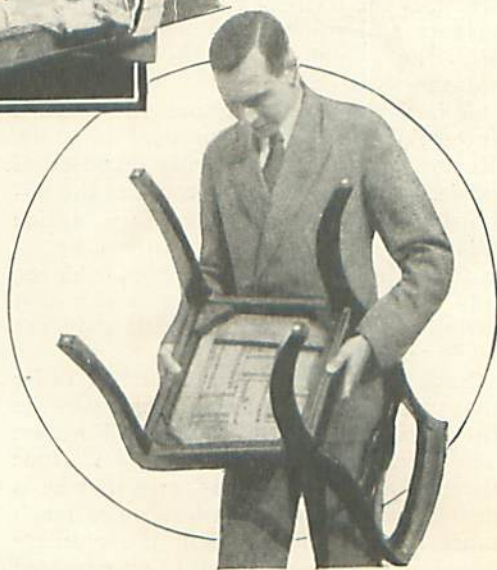
Examine the joints in all furniture you buy to see whether they are mortised and tenoned or doweled. If you do not know what a tenon joint is, place the knuckle of the middle finger of your right hand between the knuckles of the third and fourth fingers of the left hand. This arrangement of knuckles forms a figure which simulates a tenon joint. A mortise-and-tenon joint used in joining chair rungs and other parts to the leg posts resembles a candle inserted in a candlestick or in a doughnut hole. A dowel is a hardwood pin or peg used in place of nails to hold the parts at a joint together. This dowel is fitted into a glue-smear hole in the pieces of wood to be united permanently. Wooden dowels are used in all the finest furniture to join the rails, legs, posts or other parts. Dowels made of steel, about as large as thick nails, are unsatisfactory and screw dowels are inferior to those of wood. Corner blocks, wedge-shaped wooden blocks screwed to rails or notched to fit the legs of tables or

chairs, are used as reinforcements to both dowel and mortise-and-tenon joints in good furniture.

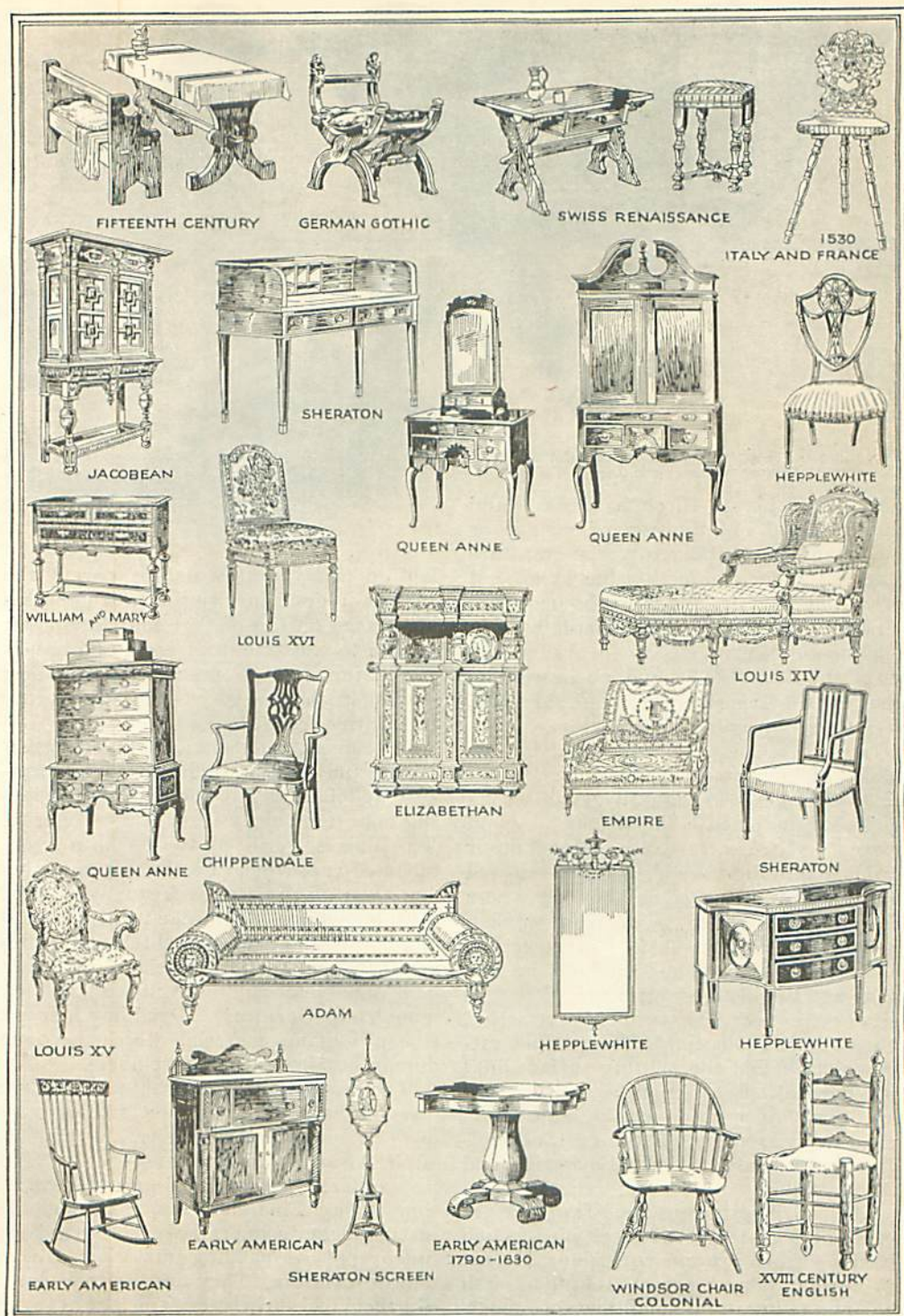
The finish of the furniture is usually a reliable clue to its quality. Inferior goods lack smooth uniform surfaces, the exteriors having rough spots which you can feel with your hand. You can scratch a small portion of the lower side or unexposed surface with your finger nail to discover if the finish is brittle. Cheap, low-quality coatings scratch readily. Such

scratches are imprinted as white marks on brittle-finished surfaces. Rub a bit of the unexposed furniture surface vigorously with your thumb until it gets warm. Cheap coatings are detected easily, as they become sticky or powdery when subjected to such an examination.

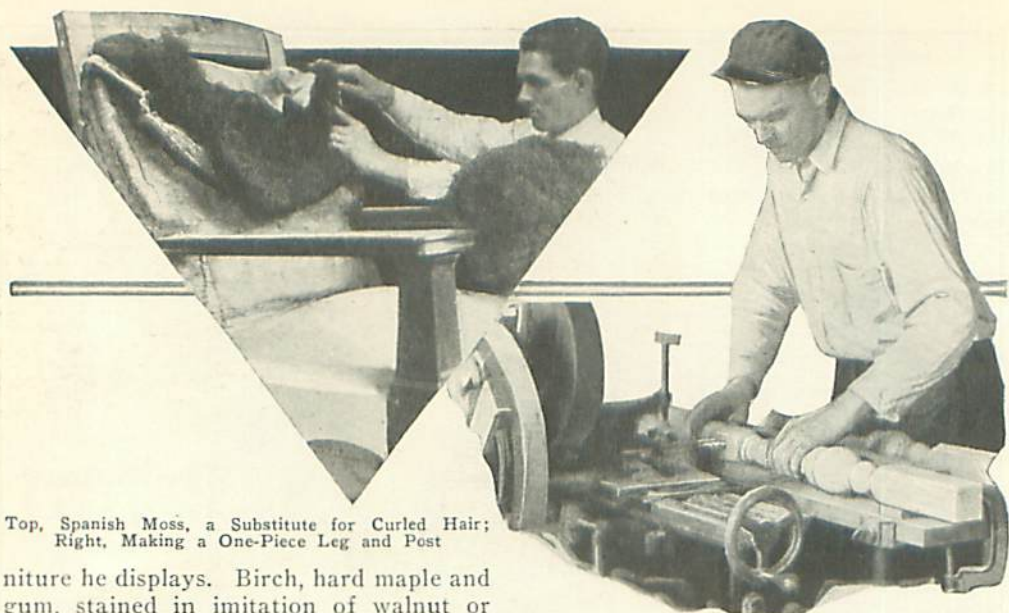
Ask your dealer what woods have been used in the frame construction of the pieces of fur-



Top, Sanding Well-Built Chair; Center, Covering a Chair; Below, the "Upside-Down" Test



Considerable Knowledge of Furniture Is Necessary in Selecting Authentic Period Designs, Both as to Shape and Construction; Above Are Shown Typical Pieces of Many Periods



Top, Spanish Moss, a Substitute for Curled Hair;
Right, Making a One-Piece Leg and Post

niture he displays. Birch, hard maple and gum, stained in imitation of walnut or mahogany, are satisfactory for furniture frames. Pine is objectionable because it dries out readily and absorbs moisture quickly from the air. The boards used in making good furniture are always finished on both sides. If you find, on inspection, that the frame is smooth on one side only, it is a sign of faulty construction.

Cheap wood is, as a rule, used for the backs of inferior furniture, such as cabinets and chests. Ordinarily, such a back is nailed in place. The backs of good pieces, on the contrary, are screwed on or grooved into their sides. Dry glue smeared around a joint, or signs showing where the glue has fallen away from sunken joints, are evidences of poor construction.

Beauty is only skin-deep both in persons and upholstered furniture. The fabric covering may be exceedingly attractive, but the discriminating buyer should satisfy himself that the alluring surface does not conceal lack of comfort and durability. Two overstuffed chairs, apparently identical, may differ \$100 in cost, depending on the quality of inside materials and workmanship.

The coiled springs in good furniture are made of high-tempered steel wire, which is enameled to prevent corrosion. The art of fitting these springs together with hempen twine in no small measure determines the ultimate comfort and service life of the chair or couch. A layer of bur-

lap or heavy cotton fabric covers the springs in good furniture, the stuffing being placed on top of that foundation. It is wise to examine mattresses and upholstered furniture to make sure that new stuffing has been used. Old stuffing is easy to identify by its strong odor.

First-quality horsehair is the most resilient and elastic stuffing used in furniture upholstery. The supply is limited, being imported chiefly from South America. This hair is sterilized, twisted into ropes, steamed and dried. Cattle hair, after being dyed black, is used frequently mixed with horsehair. Reputable furniture manufacturers and dealers will tell you on request the amounts of horsehair, cattle hair and other materials used in stuffing their upholstered furniture. Dyed hog hair is a cheap stuffing material which becomes lumpy because of its short fibers.

The few who sell "moonshine" furniture use southern moss and tow from flax as well as such vegetable fibers as tampico, sisal, African palm, jute and coconut fiber as adulterants of or substitutes for curled horsehair. Fine shavings, excelsior, and even old newspapers have at times been uncovered as padding material in very cheap furniture. They are easily detected by their feel, brittleness and stiffness. A soft, silky resilient fiber called kapok—a product of the bombax tree of Java—is

satisfactory as stuffing for upholstery when sold and used under its true name.

Be sure that you do not sacrifice comfort for style when you buy your new easy chairs. Ornate furniture with excessive crevices, scrolls and carvings is best avoided as it collects dust and increases cleaning demands.

ROBOT PACEMAKER TRAINS ATHLETES

Setting the pace for college runners, a life-size figure of a sprinter, operated by electricity, moves rapidly along the track, showing the athletes at a glance how fast they are going. The dummy in full running suit, is fastened on a wheel that has its own track. Levers and switches in a control box regulate the electric sprinter's speed. Following a practice of Roman engineers, track makers are using bundles of green fagots to keep the clay subsoil from working into the shale, the two materials widely used on foot-racing courses.



© The London Daily Mail

Electricity Propels Sprinter's Figure, Shown Attached to Wheel; a Glance at the Robot Runner Tells Athletes How Fast They Are Going



Truck Equipped as a Complete Talking-Picture Theater and with Living Accommodations for Crew; the Screen Is Placed at the Rear

THEATER MOUNTED ON WHEELS SHOWS TALKING PICTURES

Carrying complete projection and talkie apparatus, a moving-picture theater, mounted on a 100-horse-power truck with a 200-inch wheelbase, is traveling California highways at fifty miles per hour. The movie on wheels cost \$21,000 and weighs 19,000 pounds. The body is thirty-two feet long and contains a projection room directly behind the driver's compartment. In addition there are two berths, a kitchenette with electric stove, a dinette, lavatory with hot and cold running water and an office for the tour manager. The screen is suspended at the rear.



Unloading Cotton by Suction Is One Step in Mechanical Handling from Field through Mill

COTTON UNLOADING BY VACUUM IS QUICKER AND CLEANER

Cleaner, safer and speedier handling of cotton has been necessitated for the sake of efficiency in handling huge crops at low prices. New equipment has been devised in the California fields which, after the cotton is mechanically picked and trucked to the mill, sucks the staple from the carts through huge vacuum pipes. Automatic handling machinery sends it through the gins and then to the balers, where it is prepared for shipment to the spinning mills.

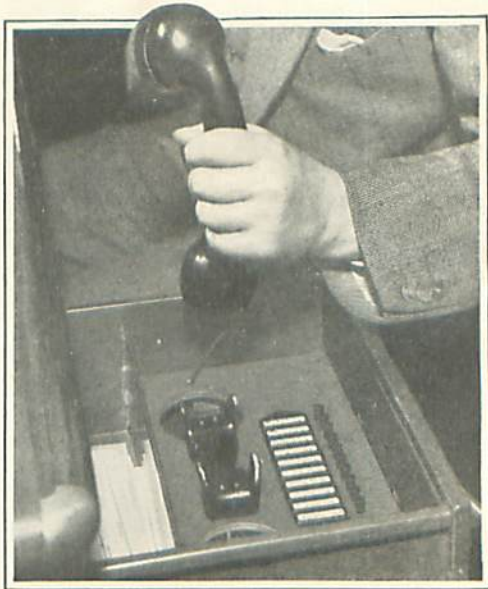
RUBBER-COATED METAL TUBING ABSORBS ENGINE VIBRATION

Aluminum alloys coated with rubber have been found to withstand the vibration of the modern airplane engine much better than the copper tubing now in use. Experiments were conducted by the army air corps with various types of tubing used in aircraft fuel systems in an effort to find a kind that would offer most resistance to vibration, which often weakens the semi-flexible tubing used for oil and gasoline connections, increasing the risk

of breaking and the fire hazard. It was found that metals made of aluminum alloy were equal in strength to copper though lighter. The expedient of vulcanizing rubber to the metal increased durability greatly. In the fittings, the tubing was flared and so designed that the shock-absorbing and sealing effect of rubber was carried inside the fitting, allowing decided flexibility at the jointure. This aluminum flared-tube construction stood up in the vibration machine about 250 hours compared with twenty-five hours for copper or aluminum tubing uncovered. In addition, the rubber-coated tube proved an added safety factor for it was found that, even if the metal broke, the rubber prevented the leakage of fuel.

PHONE KEPT IN DESK DRAWER FOR PRIVATE BUSINESS

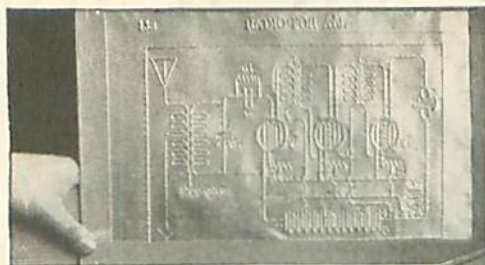
Concealed in a desk drawer, a telephone connected to points in the office by direct wires is being used for private business by one company. If the executive wishes to call his secretary, office boy or any department head, he pulls out the drawer, lifts the phone and presses the right button. Connections are made without the aid of a switchboard, insuring complete privacy in conversations.



This Telephone, with Buttons for Private Conversations, Is Hidden in Drawer When Not in Use

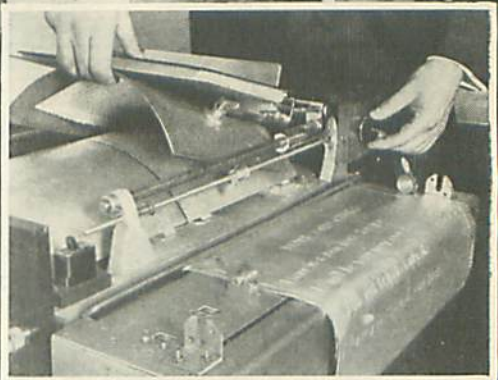
Photo Ewing Galloway

Automatic Eye for Blind Sees Ordinary Print



Left, Raised Reproduction of Book Page; Center, Blind Girl Reading; Below, Reproducing Ordinary Print

Automatic reproduction of print and handwriting in books, newspapers, maps, diagrams and pictures makes it easy for the blind to read and study anything from fashions to engineering. The machine transfers the print and handwriting from the book page to a sheet of aluminum foil in raised letters, figures and lines so that the sightless person may read by passing his fingers over the impressions. Every characteristic of the original is reproduced, whether it is a signature, picture or engineering diagram. The speed at which the foil with its impressions issues from the machine can be regulated. The book or printed page is placed, face downward, on a carriage which moves from left to right like a typewriter. As the book moves along, a rapidly revolving pencil of light strikes the printed letters or other obstructing lines, closing an electrical circuit. This causes a powerful magnet to punch into the aluminum foil a design exactly like that on the page above. Any magnification of the letters or lines can be repro-



© Andrew Halbran

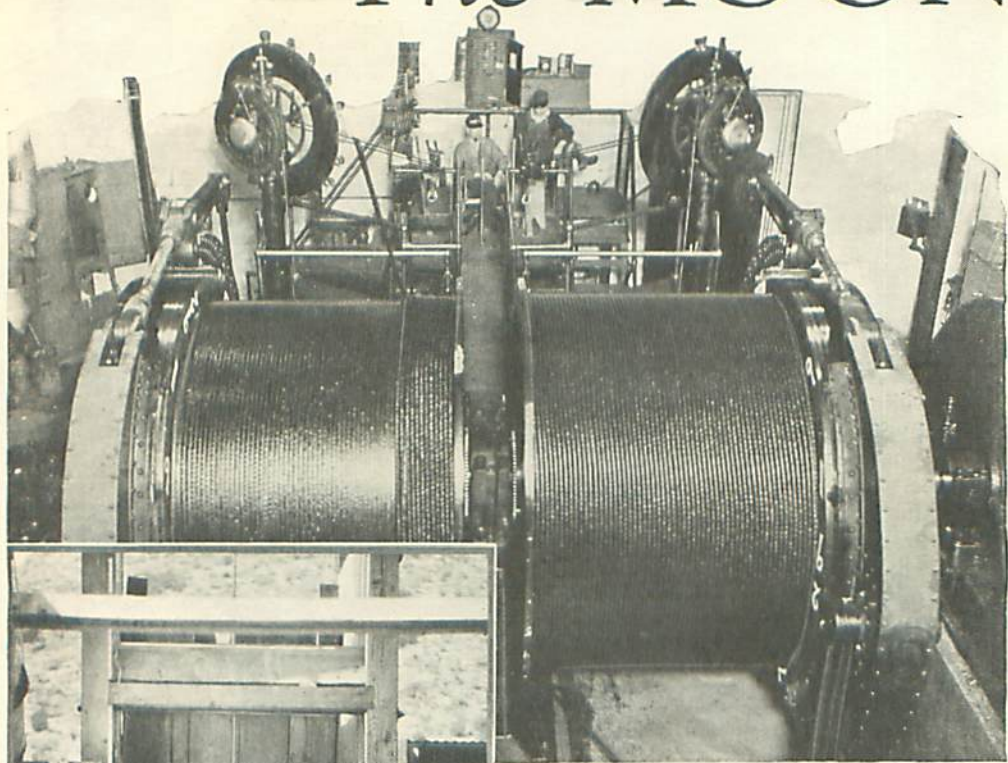
duced by the machine. If a blank sheet of paper were run through the reproducer, nothing would be impressed on the foil. But if a line is drawn on this sheet, the machine will gradually reproduce it, each revolution adding to it until complete.

"ELECTRIC EAR" FOR AUTO TIRE HELPS TO REDUCE NOISE

Production of silent automobile tires by eliminating noise resulting from design of treads and other sources is being helped by an "electric ear," a delicate sound detector. Tests under road operation are made by installing a condenser microphone with a tubing running through a hole in the car floor, six inches from the right rear wheel. This installation picks

up fewer noises from motor, gears, exhaust and the wind. A sound filter and a sensitive recording instrument show the amount of noise. In tests, the car is accelerated to maximum speed, then allowed to coast with motor shut off. Noise readings are made every five miles as the speed decreases. A ribbed tire, smooth and without tread design, is the standard by which all types are measured. Silence, plus maximum traction and safety in tread design, is the tire maker's goal.

The MOON



By TOM WHITE

SILVER, the everyday money metal of the ages, is coming back. Even now, the once popular white metal is taking its place beside its aristocratic sister, gold, if it isn't actually crowding her aside. All the great powers, except this country and France, and nearly all the smaller nations have abandoned the gold standard.

In North and South America there are 8,000 silver mines, 4,000 of them in Mexico, the world's foremost silver-producing country. These mines have long been closed as it now costs between thirty and forty cents to turn out an ounce of the white metal—more than it is worth at present—except where it is mined as a by-product. With silver selling at fifty cents an ounce, these mines and many hundreds of others in this country will be reopened. Even now, prospectors are hurrying into the hills of the far west on the trail of the

Top, Hoist at a Silver Mine Which Raises and Lowers Men and Brings Up the Ore; Below, Miners Standing on Bucket in Shaft

METAL Comes Back

Right, Skilled Chinese Silver Worker Making Ornamental Jewelry; Below, the "Sycee Shoe" of China, Silver Unit of Exchange for Large Transactions



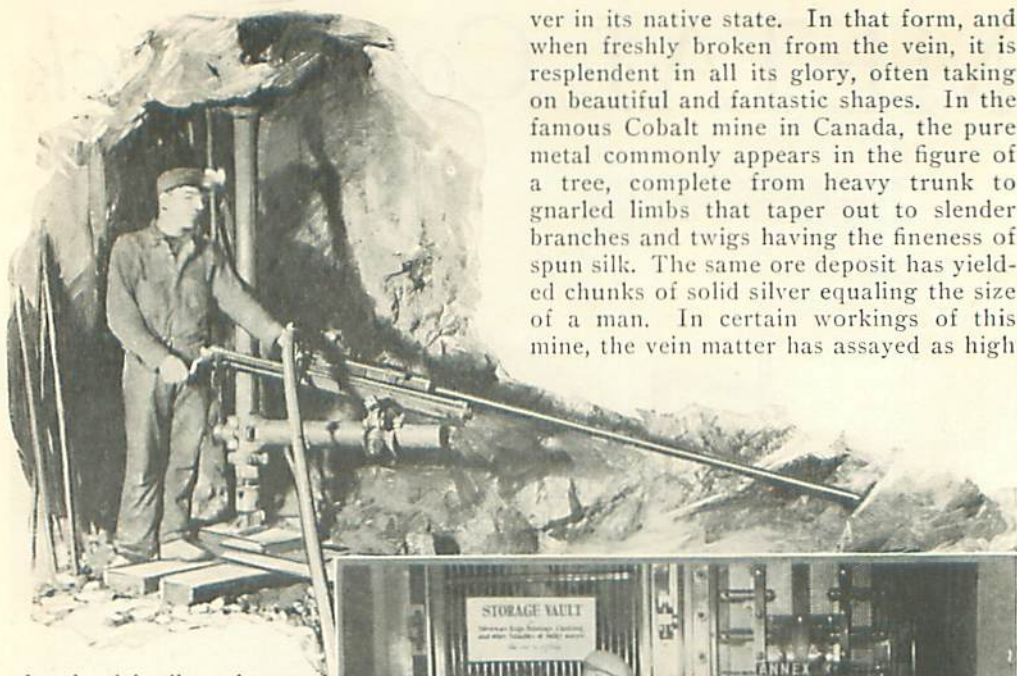
gleaming, white lode, which has not been seriously hunted since the days of the early eighties. The same invasion of the mountain wastes is going on in Mexico, where there are already more than 20,000 mining claims of all kinds, as well as in South America.

No man can prophesy how much new mineral ground will be uncovered in this newest prospecting venture. History may repeat itself, even to the extent of a chance discovery of vast underground treasure, such as the new populous district of Alamos de Catorce, in the state of San Luis Potosi, Mexico. This was an uninhabited wilderness until 1770, when a negro named Milagros, an itinerant musician, lost his way one night. As he was about to rekindle his fire the next morning, he spied several tiny globules of glistering silver under the ashes. Milagros lost no time establishing title to the valuable ground and putting miners at work. The mine paid its way from the start, and its sole owner died an enormously wealthy man.

The location of the largest single lode of silver-lead-zinc ore uncovered in modern times, the famous Broken Hill mine in Australia, was likewise a chance discov-

ery. Charles Rasp, a lone shepherd, made the sensational find in 1882 that brought miners scurrying to the antipodes from all corners of the world. His discovery created huge fortunes. A shepherd was also responsible for the discovery of silver in the Cerro de Pasco district of Peru, when, from the embers of his fire built 13,000 feet up the slopes of the Andes, he raked out fine beads of white metal. This was in 1630. From 1784 to 1889 this district yielded over \$200,000,000 worth of silver from 342 mines.

Not until 1859, long after Mexico and South America had produced a total of over a billion ounces of the white metal, was there a silver mine of any importance in this country. Two adventurers, named O'Reilly and McLaughlin, made history in the far west when they uncovered the fab-



ulously rich silver deposits of the Comstock Lode in Nevada, in 1859, bringing to light the first high-grade American silver ore. The impetus given silver mining in this country through the discovery of the Comstock Lode is readily seen by comparing the production for 1859, amounting to 77,300 ounces, with the peak year of 1915, when 74,945,927 ounces were brought to the surface.

Except when found in its native state—that is, pure metal unmixed with other chemical elements—silver hides behind a variety of disguises and is not easily detected. It often occurs as argentite, a chemical union with sulphur, which is natural considering that silver deposits are frequently the result of volcanic action. Although rusty-looking and unpromising, “red” silver contains as much as sixty per cent of the pure metal. Horn silver is a class of ore in which the metal is combined with chlorine. The white metal occurs in a variety of mineral combinations with copper, lead and zinc.

No expert eye is necessary to detect sil-

ver in its native state. In that form, and when freshly broken from the vein, it is resplendent in all its glory, often taking on beautiful and fantastic shapes. In the famous Cobalt mine in Canada, the pure metal commonly appears in the figure of a tree, complete from heavy trunk to gnarled limbs that taper out to slender branches and twigs having the fineness of spun silk. The same ore deposit has yielded chunks of solid silver equaling the size of a man. In certain workings of this mine, the vein matter has assayed as high



Above, Miner Using Compressed-Air Drill in a Silver Mine; Below, Four Tons of Silver Being Prepared for Shipment to Orient

as one-tenth pure metal; or putting it another way, a ton of this ore would contain 200 pounds of silver.

When man beheld his first chunk of the white metal, the clear, pale light reflected from it resembled so closely the rays of the moon, that he assigned to it the symbol of the crescent and called it “Luna’s metal” or “moon metal.” The term “lunar caustic” and names of similar compounds in use today, had their origin at the dawn of history.

Man’s first feeble attempts at mining amounted to little short of grubbing and scratching, surface trenching and shallow.



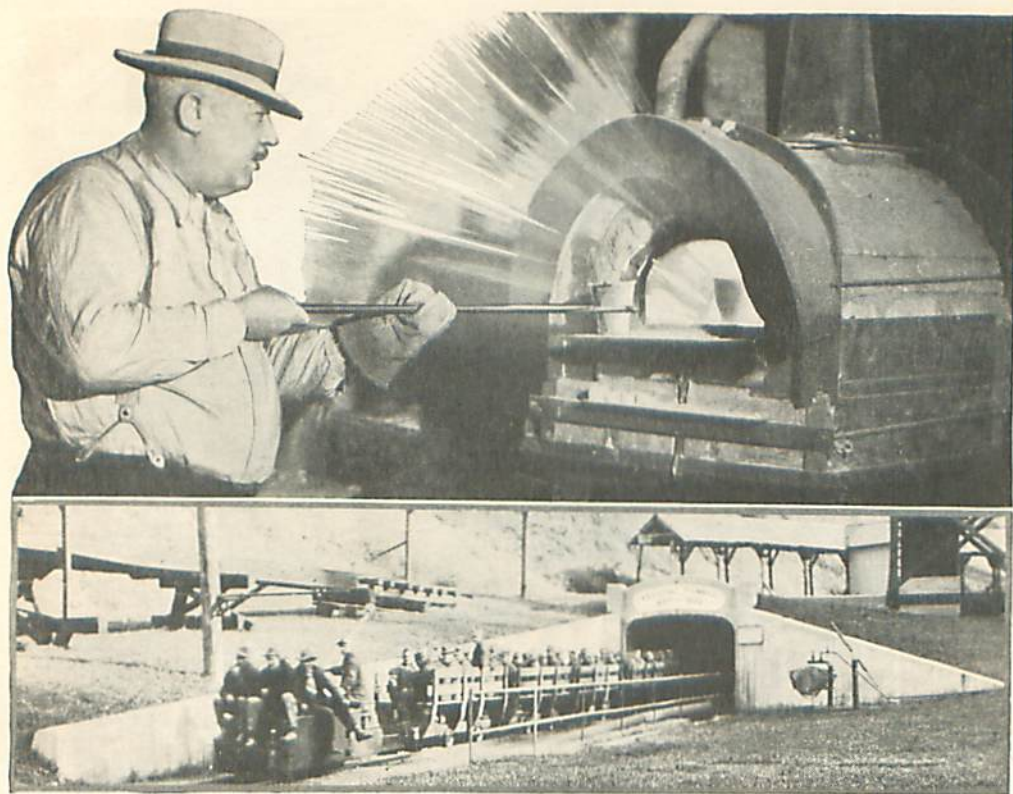
Washing Silver-Nitrate Crystals Before They Enter the Solution for the Sensitized Coating of Photographic Films and Plates, Where Much of the White Metal Is Used

burrowing; he broke rock by laboriously pounding and prying it out of place. His first real underground workings were irregular, winding and steep; his ore came to the surface in staggering loads on the backs of men who toiled up long ladders made of tree trunks with notches cut out at intervals to serve as steps. He made no attempt at smelting "complex" ores, granting he knew of their existence, contenting himself with small ovenlike inclosures in which he smelted down the native silver as he found it.

Compared with the crude means of mining silver fifteen and twenty centuries ago, the mines of today are like huge buildings tucked away underground. Air drills, built like pneumatic riveters, bore holes in the rock. These holes are tamped with explosives and, when fired, bring down tons of silver-bearing ore. Immense rooms or "stopes" connect with the shaft through tunnels along which twenty-ton loads of ore are whisked by electric locomotives and dumped in bins to be drawn off as desired and raised to the surface in huge "skips," or steel buckets, drawn by high-speed hoists. The skips also carry the

miners to and from their work. New means of separating fine particles of silver from their flinty envelopes have resulted in extracting practically all the silver from the rock after it has been brought to the surface; also, much larger tonnages are handled. Many Indians and a score of mules were required to break and grind fifty tons of ore a day at a good-sized Mexican mine as late as seventy-five years ago. Today, twenty times as much silver ore is crushed and treated daily with the aid of chemistry and electrically driven machinery in the hands of not more than twenty men.

From the year when Columbus landed on American shores to the present day, world production of the white metal has totaled 15,000,000,000 ounces, or about fourteen times the weight of gold extracted in the same period. This would be enough silver to make a ponderous cube 115 feet along the edges, or sufficient to pave the average boulevard with a six-inch layer of the shining metal for a distance of more than four miles. The age of silver is reckoned as beginning with 1493, since the voyage of the famous discoverer



Above, Sample of Silver Ore Being Given the Fire Test in an Assay Furnace, Which Is a Miniature Smelter;
Below, Miners Coming Off Shift at an Idaho Silver Mine

furnished the key that immediately unlocked newly found storehouses of fabulous wealth.

The two largest producers of silver in the world are Mexico and the United States. Beginning with 1901, when Mexico turned out 58,000,000 ounces and this country 55,000,000, the southern republic has held first place, with few exceptions, until recent years, when her mines produced as much as 100,000,000 ounces a year, while the average production of American mines was 63,000,000. In 1930, this country's output was only 50,000,000, due to the lowered production of copper, lead and other metals of which silver is mined as a by-product.

Nearly half the world's silver, or 7,000,000,000 ounces, is held in China and India in the form of ingots, ornaments and coins. The Indian Treasury alone held 452,000,000 ounces on November 1, 1931.

Except the United States, nearly every country has debased its silver coinage to

the point where it is only .500 fine, or exactly one-half pure silver. American silver pieces are minted .900 fine, the remaining ten per cent being copper that is added to give the required wearing qualities. Such a coin, with average use, will survive forty years of circulation.

Aside from its natural beauty and the fact that it is, without exception, the easiest metal to work, all signs now point toward the increasing use of the white metal in the world's money markets.

FRANCE TO DESTROY OLD CARS AFTER TENTH YEAR

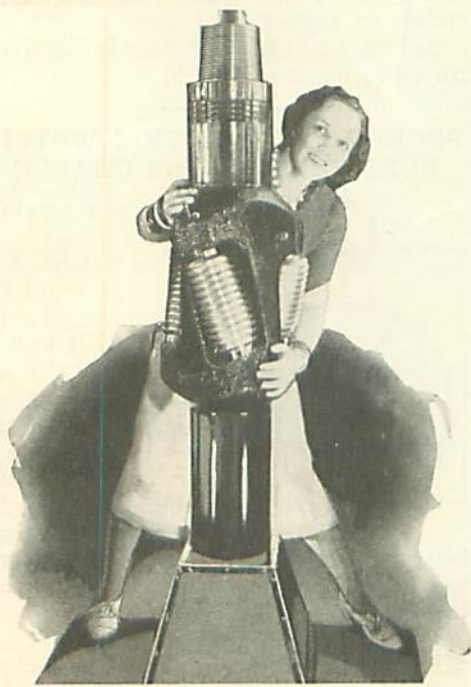
Automobiles in France more than ten years old will be destroyed by government agents under a plan approved recently by the national automobile chamber of commerce. A fund would be created for this purpose by a tax of about \$5.40 on every new car sold, enabling the destruction of 45,000 cars a year, according to estimates.

COTTON SEEDS YIELD GASOLINE BY CRACKING PROCESS

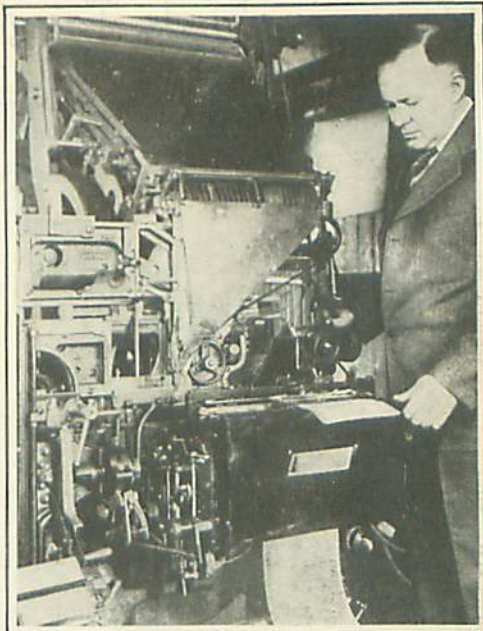
Cottonseed oil, now used for cooking purposes, will yield as high as fifty-seven per cent good-quality gasoline by means of a cracking process, and the cotton fields of the south may offer this country its future supply of automobile fuel. This statement was made recently by Dr. Gustav Egloff, representing an oil-products company, after extensive experiments. From the present economic standpoint, production of gasoline from cottonseed is not practicable, due to vast supplies of crude oil available, but cottonseed gas is quite practicable from a technical standpoint, he said.

LATEST OIL-DRILLING MACHINE ENLARGES SIZE OF WELL

Among the latest machines for drilling oil wells is a reamer, which is used in re-boring wells to accommodate larger casings. The drill has several cutting surfaces, the first to grind away the sides of the well gradually until it becomes possible to start the main blades.



The Girl behind the Reamer Gives an Idea of the Size of This Oil Driller



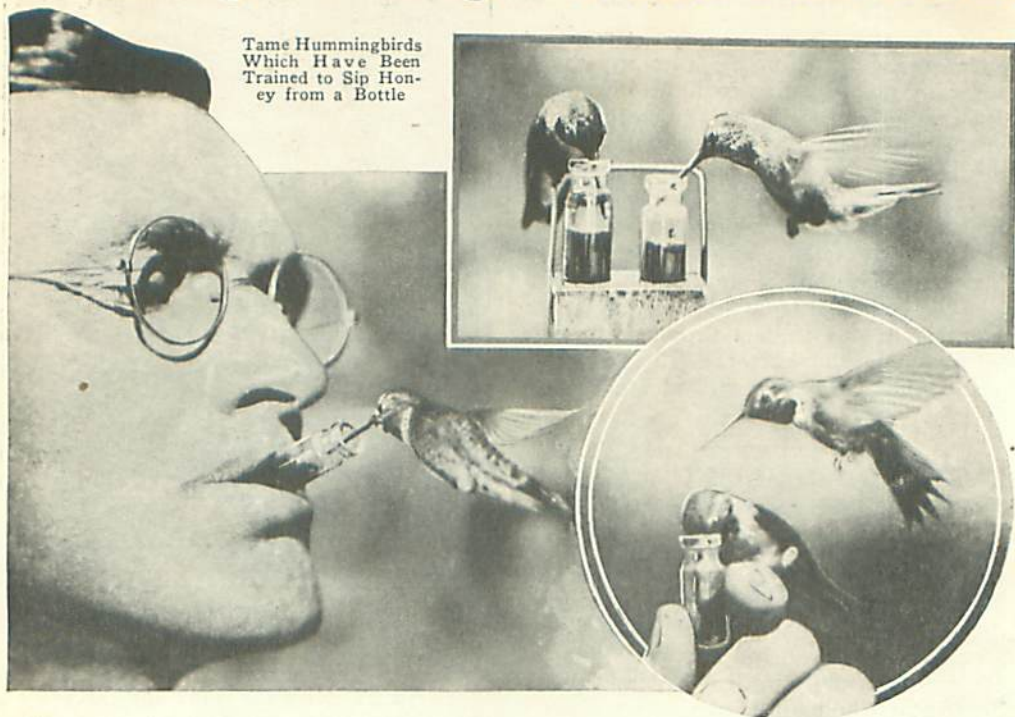
Paper on Which Story Is Written Being Fed into Machine Which Reproduces It in Type

TYPE IS SET BY ELECTRIC EYE AS IT READS THE STORY

Automatic typesetting, long the dream of the printing industry, has become a reality. The "semagraph," a combination of the photo-electric cell and the linotype machine, can convert a story into type as fast as the linotype can be operated. A tiny beam from the cell, or electric eye, "reads" the story and sends impulses to the letter and symbol selector so that each line in the story is cast into a slug of type just as it appears on the paper. Semi-transparent paper is used for the story, permitting the passage of light from the electric eye through a combination of dots placed under each letter and symbol by a special typewriter. This typewriter has a space bar which guides the reporter in writing each line to just the right length to fill up a line of type. The automatic typesetter takes care of short lines, eliminations of portions of lines and other corrections that editors might make. A carriage for the story to pass under the electric eye replaces the usual linotype keyboard. The words are merely for guidance of editors, since the dots control the action of the typesetting machine. One man can watch a whole battery of machines.

Hummingbirds Taught to Feed from Bottle

Tame Hummingbirds Which Have Been Trained to Sip Honey from a Bottle



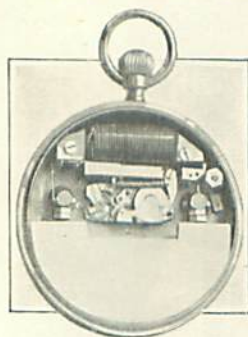
Hummingbirds are among the shyest of creatures, but one Colorado man has proved that they can be tamed. He made a few wooden stakes and sunk a perfume bottle on top of each one, with a wire perch alongside. The bottles were filled with honey, weakened with water, but the hummingbirds failed to sip the honey from the containers placed here and there among growing flowers. Finally artificial flowers were placed over the tops of each of the bottles and these lured the birds which began sipping the nectar. Gradually the stakes were moved nearer the house and at last on the window sills until the birds were thoroughly tame and would even eat from a bottle held in the hand or mouth of the patient trainer. Since 1928, these tame hummingbirds return each year to the same garden.

SEEING THROUGH METAL

English metallurgists have produced a nickel foil, or leaf, so thin that print can be read through five thicknesses of it, spaced about one sixty-fourth of an inch apart. It is made by electro-depositing

nickel on copper, and then copper on nickel after which the copper is dissolved from this metal sandwich.

POCKET-SIZE ELECTRIC WATCH RUNS YEAR ON ONE CHARGE



After twelve years' work, a Swiss watchmaker has succeeded in producing an electric pocket watch. The difficulty of making an accumulator small enough to fit in a watch case was the biggest problem. The storage

battery can be charged from an ordinary radio set with sufficient current to run the watch a year.

☛ Brake lining on automobiles, attached with aluminum rivets, will not scratch the drums.

CIVILIZATION IS FOUND IN CITIES OF DESERT

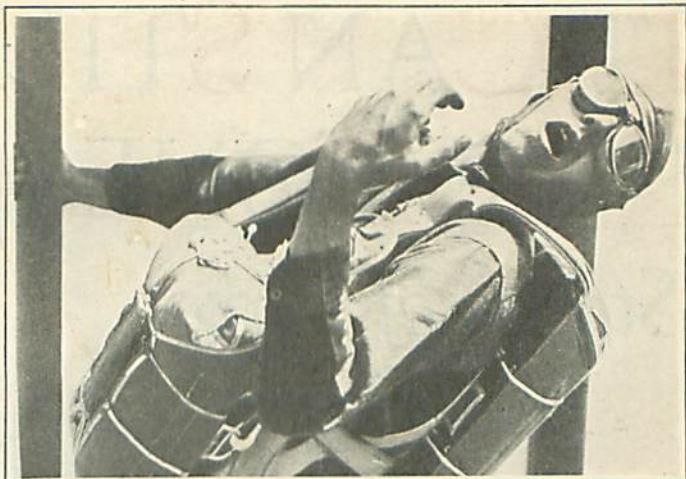
Through the friendship of a native ruler, a German explorer recently was allowed to visit the interior of the ancient independent principality of Hadramaut in southern Arabia, a land presumed to be a trackless desert and visited by only one white man previously. Instead of sand wastes, the adventurer found prosperous cities and fertile, irrigated lands. The cities were comparatively clean, for ingenious sewer and drainage systems had existed there for centuries, and plague and cholera were unknown. Most remarkable of all was the architecture, for the houses were tall and among them were many ten-story structures, all built of sun-baked mud bricks.

AUTO WAXED WITH SPRAY GUN OPERATED BY HAND

In less than an hour an automobile can be given a high wax polish by using a spray gun for applying the protective finish. The wax is in liquid form and the top of the container screws to a spray gun operated by hand. The nozzle may be adjusted to give a spray of any degree of fineness. It takes only a few minutes to spray a car, and after it has dried, the wax is polished to a gloss with a soft cloth.



Hand-Operated Spray Gun Attached to Can of Polish for Applying Wax Coat to Automobile



Parachute Jumper Ready for His First Leap; He Is Allowing the Wind to Pull Him from the Plane, an "Easy" Way of Going

ROSTER OF CATERPILLAR CLUB NOW OVER FOUR HUNDRED

During 1931, eighty-five names were added to the roster of the Caterpillar Club, membership of which is limited to pilots forced to "bail out" from their airplanes and descend to earth by parachute to save their lives. During the first few months of this year seven other names were added, bringing the total to 433. Col. Charles Lindbergh, a charter member, has been forced to jump four times, and a dozen others have performed the stunt twice each. Not as many had to leap last year as in 1930, when 131 members landed in the club. The 1931 group included twenty-seven civilians, three mail flyers, and the rest were from the army and navy or air-corps reserve.

SILKS WITH STRENGTH OF IRON MADE FROM CHEMICALS

Test-tube magic today is producing synthetic materials superior in some respects to the natural ones. At a recent meeting of the Pennsylvania Academy of Sciences many of the products of the chemical laboratory were exhibited, including a silk made from chemicals that is said to be as strong as iron, and a form of synthetic rubber more elastic than the real kind. It was predicted that plastic materials to supplant both wood and metals would be developed soon.

IT CAN STILL BE DONE

Stories of Great Americans

from SECTION HAND to
RAILROAD PRESIDENT

BY
Frazier Hunt

HE was going on nineteen, and every morning he would come down to the roundhouse in Lyndonville, Vt., and go over the old "Enterprise"—you know, oil her up and polish the brass work, and shine up the name plate.

He'd just been made fireman, and he was proud of his engine; and this early morning in 1879 he just couldn't stand it any longer. After he'd got the steam pressure up, he slipped over into the engineer's seat, his hand went up to the throttle and he opened it just a little bit, and—thrill of thrills!—the thirty-ton giant of the Central Vermont actually moved. It was alive!

Then the boy tried it again—started it, and stopped it. Then he just had to go ahead—he had to take it out of the roundhouse. And later when the regular engineer came, there was his panting steel steed all ready and waiting for him outside the stable. This boy had done it on his own initiative.

His name was Daniel Willard, and all this happened fifty-three years ago, but never in all the successful and adventurous years since then has there been a moment that compared to that second when he felt, for the first time, the great power

—Not Horatio Alger— Just America

SOME few weeks ago when I was talking with the President of the United States, in the White House, about America today—how different it is from the story book America of fabulous opportunities of a generation or two ago—President Hoover said:

"Why, America is more the land of opportunity than ever before. The American boy or girl has even better opportunities and chances today than he had forty years ago. There are more people, more institutions ready to help, more doors of education open to any who would enter. And the young man today is more serious than he was a generation ago. The motor car, the radio, and scores of other things have broadened his vision and his horizon, awakened his ambitions—and shown him how to fight for them. . . . We are still a nation of doers and workers. Almost every one of our great leaders in industry, finance and government has climbed upward through his own efforts; they have earned their bread by the sweat of their brow."

You don't have to believe in any Horatio Alger business—just believe in America.

FRAZIER HUNT



and weight that was responsive to the touch of his hand.

Ever since that moment, Daniel Willard has loved locomotives. To him, they are as warm and individual and as memorable as human beings. Even now he can name the nineteen or twenty old engines that that section of the Central Vermont had; and when the great Baltimore and Ohio railroad system had its latest series of 120-ton monsters made, Daniel Willard himself named them for the presidents of the United States.

Now way back there, fifty-three years ago, when this boy Dan for the first time drove the old "Enterprise," he wasn't afraid to tackle things that looked difficult—things that he didn't have to do unless

he wanted to. But he always wanted to.

And for all this past half-century he has approached life and opportunities and responsibilities exactly the same way.

He has gone out and met them; he has not been afraid to accept them. At seventy-one, he still goes right ahead doing his job, accepting his responsibilities, taking advantage of his opportunities and incidentally using an extraordinary amount of good, old-fashioned common horse sense, pretty thoroughly mixed with character and integrity, and well seasoned with sheer determination.

I am very much inclined to believe there is such a thing as the "genius of common sense." I doubt if any man has reached and held to any great heights, who wasn't pretty well endowed with this homely and rather misunderstood virtue. Without it, people just simply don't go very far; and if by some tremendous outbreak of fortune, they are shot up, unless they use common sense they don't stay up. But with common sense must go character and determination.

When young Daniel Willard finished district school at sixteen, he taught for a term or two before he went to high school. He wanted to go to Dartmouth college and then to medical school, but there wasn't the money to send him. Down at Amherst, the state agricultural school, they were eager to get new students and were offering special tuition rates. So this farmer boy enrolled there.

There it was for the first time that that strange, unseen force that most of us call Fate, entered his life; his eyes began to fail him and the family physician ordered him to give up school. He wasn't going to get to be a doctor after all.

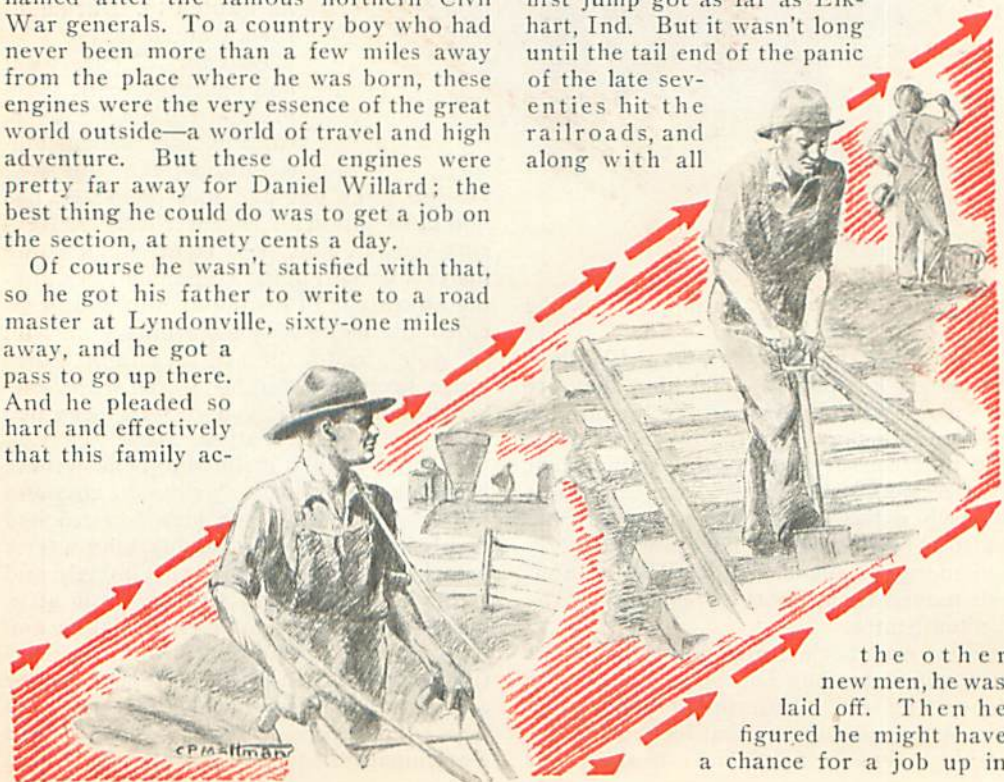
Well, if he couldn't be a doctor, one thing was certain to Daniel Willard—he didn't propose to spend all his life on a rocky Vermont farm. Somehow or other, he'd get out of there. But the first thing was to get back his health, to get a job and earn a little money.

Through the lower end of the farm ran the Central Vermont railroad, and in those days the engines had great pot-bellied smokestacks, and were gaily painted, and named after the famous northern Civil War generals. To a country boy who had never been more than a few miles away from the place where he was born, these engines were the very essence of the great world outside—a world of travel and high adventure. But these old engines were pretty far away for Daniel Willard; the best thing he could do was to get a job on the section, at ninety cents a day.

Of course he wasn't satisfied with that, so he got his father to write to a road master at Lyndonville, sixty-one miles away, and he got a pass to go up there. And he pleaded so hard and effectively that this family ac-

quaintance put him on the extra list of firemen, and before long he made his first run on an extra freight for Newport as a fireman. Pretty soon he got on the regular list. And then came that early morning when for the first time he drove the old "Enterprise" out of the roundhouse; he was on his way—and nothing in the world could stop him. He had determined to "get somewhere" and he had the integrity and the character to keep his head high and his heart clean, and his dreams true and steadfast; and he had the common sense to say and act and do the right thing at the right time.

He simply went straight ahead, and a couple of years after that high moment in the roundhouse, he moved permanently over to the right-hand side of his cab. Now, it would have been a simple matter to have remained on the old Central Vermont the rest of his life, but that determination of his wouldn't let him do that. In the first place, he wanted to move about and see the world. So, a couple of years after he got to be a locomotive engineer, he heard the call of the west, and on his first jump got as far as Elkhart, Ind. But it wasn't long until the tail end of the panic of the late seventies hit the railroads, and along with all



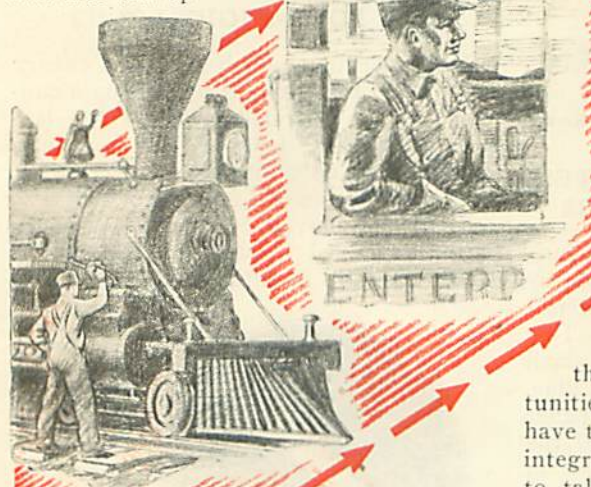
the other new men, he was laid off. Then he figured he might have a chance for a job up in

the northwest; so he shipped as far as Minneapolis and, before long, found a job as fireman on the single construction train of a brand-new railroad that was being built up there—a railroad which at that time had only two miles of track built, but some day was to be known as the great "Soo line."

Common sense told young Dan Willard that even if he had been an engineer with his own engine, a fireman's job was a whole lot better than nothing, and besides there'd be more engines some day. Three virtues—horse sense, integrity and determination—pulled him out of that construction cab before many years and got him into the op-

is the recognized head and spokesman of all the great railway executives of America.

Much of this



extraordinary Daniel Willard's life belongs to another generation, but what he did can still be done in America. Opportunities, after all, are only for those who look for them, and opportunities can only be used by those who have the preparation, the background, the integrity and the genius of common sense to take advantage of them before they slip by.

eration end; and then to superintendency of a 500-mile division. Long before this he had caught the eye of F. D. Underwood, who was the general manager, and when Underwood was made general manager of the Baltimore and Ohio, he took Daniel Willard, now thirty-nine, along with him as his assistant. Then the two moved over to the Erie, where one was president and the other his assistant. In 1904, the ex-Vermont section-hand was made vice president of the C. B. and O., and six years later, president of the Baltimore and Ohio. Now, for almost twenty-two years, he has been president of that great system and today, unquestionably,

AUTOGIRO LIKE FLYING BULLET IS WITHOUT WINGS

Small enough to fit an ordinary garage, a tiny wingless flying machine has been developed and successfully flown by Juan de la Cierva, inventor of the autogiro. The machine is actually a small autogiro, shaped like a flying torpedo, and can take off from a backyard or roof top, but has so little wind resistance that, once aloft, it shoots through the air like a bullet. It is equipped with windmill vanes and has only a mere suggestion of a tail. The wingless autogiro gives promise of being much faster than any ordinary airplane and, in addition, may be virtually uncrashable.



Sharp Edges and Spearlike Points Are Put on Korean Kites for Battles in the Air

SHARP-EDGED "FIGHTING KITES" WAGE KOREAN SPORT WARS

Sharp-edged "fighting kites" wage furious air battles in Korea, the men and boy operators striving to cut their opponent's cord to put the kite out of the fight. Two long, pointed ends are armed with small pieces of broken glass imbedded in glue, giving a knifelike edge. Heavy rice paper and bamboo rods form the body of the kites. Kite battles are a favorite sport in the country.

SOUND WAVES STERILIZE MILK FLOWING AROUND VIBRATOR

Milk and other liquids flowing around a vibrating tube can be sterilized at the rate of 100 quarts an hour in laboratory apparatus devised by Dr. Leslie A. Chambers and Prof. Newton Gaines. The two scientists believe that their equipment can be expanded for commercial use, killing more than eighty per cent of dangerous germs in fluids by a continuous process. In their early experiments, only milk in a flask could be sterilized. The process has now been developed to the point where a liquid is robbed of germs as it flows around a vibrating nickel tube inserted in a large glass jar. The next step will be the use of

apparatus in which unlimited quantities of milk can be treated. A nickel tube, caused to vibrate intensely and at a high rate while partially immersed in a liquid, is very destructive to bacteria and other organisms. Vibration is produced by placing the tube in a rapidly alternating magnetic field controlled by mechanism similar to that used in radio broadcasting. In a few samples of sound-sterilized milk, all germs were killed, but the general reduction is around eighty per cent. This treatment does not destroy bacterial spores, which are immune also to pasteurization. However, the real trouble-making germs in milk are not spore formers. The process uses no heat.

TWO-WAY ELECTRIC LANTERN HAS LONG-SHORT FOCUS

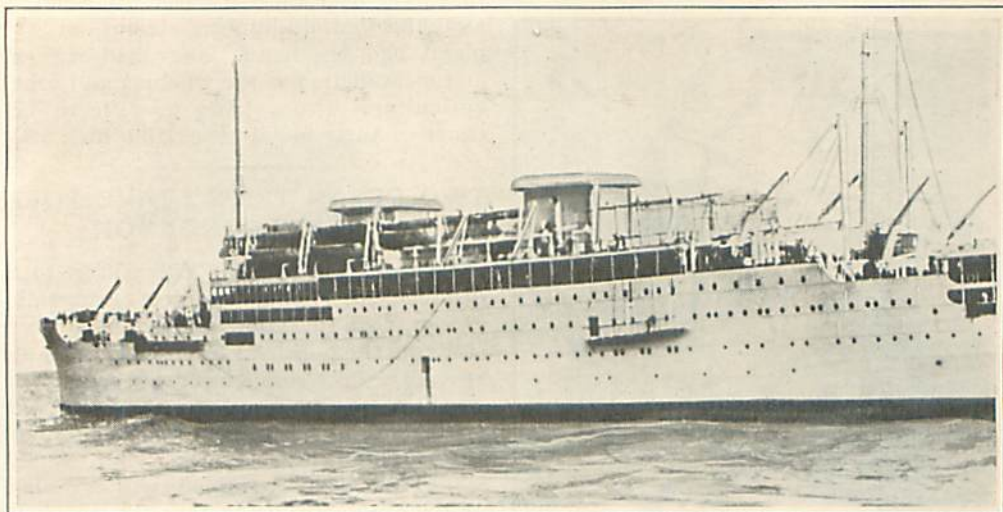
Dual reflection, which permits a change from beam to floodlight by moving a control lever, is provided in an electric lantern now on the market. The lantern is equipped not only with the usual reflector, which throws an 800-foot beam, but also with a small movable reflector. When the latter is moved forward by the control lever, the light is diffused into a brilliant



Beam or Floodlight Is Available by Moving Small Reflector Ahead or Level with Larger One

flood. Moving this reflector back flush with the large one brings back the beam. Two ordinary batteries supply current.

Fads in Funnels—They're Square This Year



© International News Photo

Here Is Proof That Even the Funnels of Ocean Liners Must Bow to the Dictates of Fashion; This French Boat Has Square Funnels Like Chimneys, Although One of Them Is a Dummy

Fashions in funnels for ocean liners are changing and one French motorship, the "Georges Philippar," is equipped with square ones instead of the usual round kind. This boat has two low square funnels, both with big cornices around the edges. One of them is a dummy.

PUNISHMENT FOR EVERY ERROR INCREASES ACCURACY

Skill and accuracy are increased by inflicting punishment for every error, grading the punishment to the degree of error. This is the conclusion reached from experiments conducted recently in the psychological laboratory of the University of Cincinnati. In the tests, sixty-six persons threw balls at a target, the apparatus being designed so that the thrower received a mild electric shock each time the ball failed to hit the bull's-eye. In other tests the shocks were administered only when the ball hit the outer part of the target or missed it entirely. Punishment for all errors was found the most effective means of increasing accuracy. Punishment for throws which did not reach the bull's-eye or an area immediately surrounding it, were next in efficiency. Knowledge of just how much each ball missed the target also increased the scores. The tossers

made the poorest scores when they were hurried by directions to throw every time a light flashed, the interval between flashes being two seconds. They also made low scores when their attention was diverted to another task being done at the same time, and when they were merely told to throw at the bull's-eye and then let alone. The following were factors of but doubtful value: For the thrower to say at each trial, "Now, this one is going in"; punishment only for bad errors, and keeping the eye and attention on the bull's-eye.

SPARE IGNITION COIL FOR AUTO STOPS DELAY ON ROAD



Offered to eliminate delay on the road, a spare ignition coil for automobiles has been placed on the market. If the ignition system of the car fails from defective contact points, broken condenser, cold motor, or even a lost switch key, the emergency coil can be attached quickly to start the auto.

RADIUM BOMB FOR TREATMENT OF CANCER KEPT IN LEAD



Patient Undergoing Treatment with Radium "Bomb," Which Contains Four Grams of This Substance

Four grams of radium, valued at \$200,000, compose the heart of a "bomb" employed in a Chicago hospital to treat cancer and tumors. The radium is kept in a lead receptacle weighing 1,500 pounds. The radiations pass through ordinary metals, but the density of lead stops them, thus making it possible to control the radium in its container.

ESKIMO DIET PROTECTS TEETH FROM EARLY DECAY

More proof that the modern diet contributes to dental decay has been found in an examination of teeth of Eskimos in Alaska. Ancient Eskimos were meat eaters. In 800 jawbones of these prehistoric people, only six and a half per cent of the lower molars were defective. These molars usually are the first to succumb to decay. Examination of the teeth of 296 living Eskimos showed twenty-six-per-cent decay. Eskimos living near white settlements have a greater percentage of dental decay than those in the remote regions, where there is no chance to supplement the native diet with modern foods.

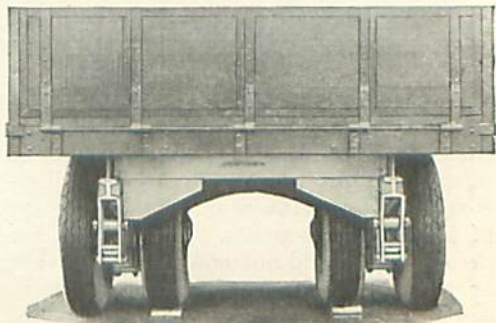
Grain-eating races generally have poorer teeth than the meat eaters. Indian tribes that lived near the sea coasts of America and the buffalo-hunting tribes of the plains had fine teeth. They had seafood and meat diets, but the Pueblos and other agricultural tribes have poor teeth because of their mainly vegetable diet.

TWO OCEAN TRIPS LEAVE PORK IN GOOD CONDITION

Two trips across the Atlantic, a total distance of 8,000 miles, left American-grown pork in good condition. While studying the pork market in England, food specialists here shipped seventy sides from hogs raised in Montana to Liverpool. Later an English broker selected four of the sides and shipped them back to America. They were examined, photographed and cooked after being found in excellent condition. This indicated that American pork will arrive in England as prime as meat from other countries.

TRAILER-TIRE LIFE IS DOUBLED BY SEPARATE SPRINGS

Saving of at least fifty per cent in tire wear is claimed through the adoption of independent springing and the use of four wheels, instead of the customary two, on the rear of a tractor-truck trailer. Where dual tires are placed on each of the two rear wheels it often has been found that one tire bears most of the weight. With four wheels in line the weight is more evenly distributed and the separate springs allow each wheel to carry its share of the burden, regardless of road irregularities.



Truck Trailer with Four Rear Wheels, Each Independently Sprung to Carry Its Share of Load

Flying Bikes Fitted with Wings and Rockets

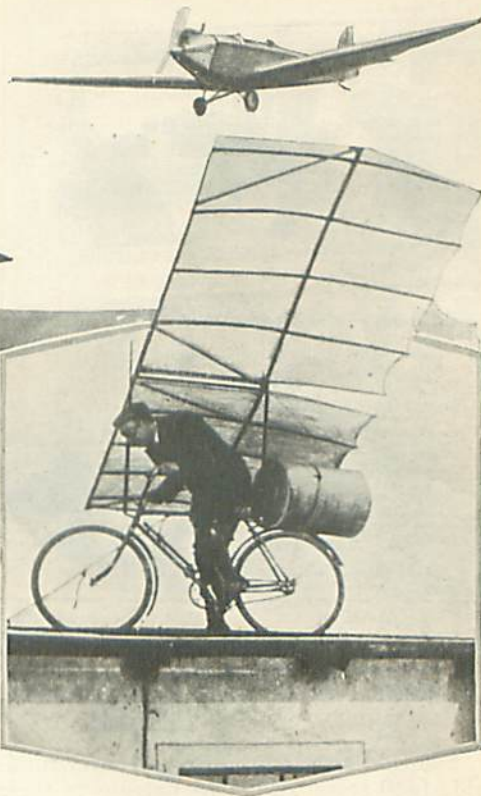


Above, Pedaling the Propeller of a Flying Bicycle;
Right, Bicycle Fitted with Wings and Rockets

Almost simultaneously, two German inventors recently made test runs with two forms of flying bicycles, one equipped with wings and the other fitted with both wings and rockets for propulsion. The simpler form of vehicle is just a bicycle fitted with wings attached to a light frame extending above the rider. The pedals are geared to a propeller and the rider furnishes the power to revolve the blades and lift himself and his craft into the air. The rocket bicycle has wings above the rider and rockets attached to the rear wheel. The rider pedals for the start then uses the rockets to gain added momentum and rise into the air. In a test of this machine, the bicycle attained a speed of 108 miles an hour before soaring into the air. The test was made from the roof of a building, the vehicle being driven off the roof when sufficient speed was attained.

TWIN EYES IN AUTO HEADLIGHT ELIMINATE GLARE

Twin "eyes," fitted behind the lens of automobile headlamps, help to eliminate the glare. Reflection from the top and bottom of the light is prevented by dark sections above and below the device, while a narrow strip runs between the eyes. The



twin eyes concentrate the reflection into a powerful beam that lights up the road ahead and at the sides without blinding approaching drivers.

PHONE "SERVANT" TAKES CALLS FOR ABSENT SUBSCRIBERS

In Switzerland, if the person called by telephone is out, you can call the telephone company information bureau and leave a message to be delivered to the subscriber when he returns. This is known as the telephone-servant service and is available to those having telephones with automatic dials at a rate of \$1 a year. After the name, address and number of the subscriber in the directory appears a notation, "When no reply call No. 11," which is the information bureau. This bureau will take a message to be delivered later or will furnish information as to the whereabouts or time of return of the party called, if he has asked that this be done.



Trays for Serving Auto Passengers Have Hooks to Fit on Inside of Window Ledges

INNER AUTO SERVING TRAYS FIT WINDOW LEDGES

Shaped like a lighthouse, a Denver roadside food stand serves its patrons in their automobiles on a patented metal tray which rests on the inside window ledges, extending across the car and permitting the closing of windows. The road stand is equipped with a revolving tower, which turns spotlights on two advertising signs three times a minute. A one-horsepower motor drives the tower. Building and tower are both patented.

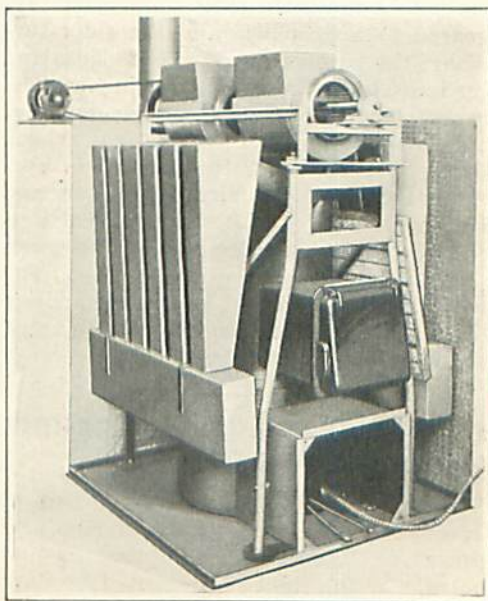
INSECT CAMOUFLAGE NO GUARD AGAINST ITS ENEMIES

Insect tricks of mimicry and camouflage are no protection against enemies. Some insects are endowed by nature to look like a dangerous or ill-tasting species, while others can make themselves resemble a leaf or a twig. But birds eat all kinds. An examination of bird stomachs shows that beetles, which are armed with ill-smelling secretions and hard shells, all fell victim to their foes. The sting-armed family of bees, ants and wasps fare no better. The birds eat the "stingers" and also the un-

armed ones that mimic the stingers. Toads, mice, foxes, bears, badgers, skunks, and other animals, also make victims of the most powerfully armed of the insects.

WEATHER IS MADE IN THE HOME TO FIT YOUR NEEDS

Adaptable to steam, hot-water and forced air-heating plants, an air conditioner for the home has been placed on the market. In tests, air in an average-size home has been raised from a relative humidity of twenty per cent to forty per cent in one hour, three quarts of water being absorbed by the air passing through the conditioner. Washers and filters clean the air. In communities where water temperatures are sixty degrees or lower, the unit is also adaptable to summer cooling. Where the temperatures are higher, an auxiliary unit cools the water before the house temperature is lowered. In warm-air heating plants, a specially designed furnace, adapted to burning oil, gas or stoker-fired coal, is used. Washers and filters are placed within the cold-air returns on the side of the furnace, while fans on top of the furnace help to circulate the air. For steam and hot-water heated homes, the air conditioner is a separate unit, placed in the basement and connected with a register.



This Plant Conditions Air in the Home by Maintaining the Proper Humidity Winter and Summer

CANOE HIGHWAYS of the NORTHLAND

By JAMES MONTAGNES

CANOE trips through the north woods are becoming more popular each year. Adventure and the test of physical strength in battling foamy rapids are the principal reasons why such trips are now made through territory ranging from the northern states to above the arctic circle.

Advice that comes from experienced long-distance canoeists is that, on short trips, it is not absolutely necessary to take a guide. On long trips, or any trips into the distant bush country north of the railway line in Canada, guides should be taken.

Canoes should not be under sixteen feet in length. Where many portages have to be made a light canvas-covered craft is best. For ordinary use one of cedar or basswood is generally used. Three paddles and two kneeling cushions should be part of the equipment.

Handling a canoe in northern waters requires experience. The guides of the northern bush who have had many years of traveling by canoe in a country, which up to a few years ago was "back of beyond," always reconnoiter a series of rapids with which they are not familiar before plunging into the white, swirling waters. Once the canoe is in, you cannot get back again. Therefore the precautionary survey.

Before going into any rapids, they lash their baggage tightly in the boat. That is so that there can be no shifting of cargo while navigating the tumbling waters



Lightly Loaded Canoe in Prince Albert National Park, Canada



Above, Carrying Canoe over a Beaver Dam; Left, Northern Guide Carrying a Heavy Pack



between the rocks. In case of a spill, with the cargo tightly lashed, nothing will be lost. Especially are rods and guns carefully lashed in place, for on them depends the supply of fresh food.

Portages have to be considered in packing all camping and personal equipment, as well as food supplies. Grips and handbags are taboo on a canoe trip. Dunnage bags and pack sacks are used, because they are easier to carry, weigh less and take up less room. In packing them, the

articles most needed are placed near the top so that the whole bag will not have to be emptied every time. Packing becomes an art, for it is necessary to stow as much into as small a space as possible. Cooking utensils and food for lunch are always packed near the top.

Waterproof dunnage bags are recommended. They should not be packed to weigh more than forty pounds fully loaded. They should be carried as high up on the back as possible to avoid swaying and ease the load, for a pack which punches the small of the back gets very heavy after a short time, while one carried high can be toted for longer distances with less strain. Indians have been known to pack 600 pounds, but for the average canoeist loads of about 100 pounds are the usual.

What the pack sacks should contain largely depends on the duration of the trip. For personal equipment, which includes clothing, woolen shirts are advised and old clothes advocated. Besides clothing and toilet articles, a compass, fishing rod and tackle, camera, sewing kit, made up of an assortment of needles, threads, yarns and buttons and a pair of small scissors, should be included. Two to three blankets, a waterproof ground sheet, a

flannel sheet, mosquito netting and mosquito dope, should be carried by each member of the party.

Tracking ropes, ax, candle lantern as well as flashlights, preferably a small seven-foot-square silk waterproof tent because it is the lightest, cups, plates, pots and pans, dishcloths, candles, cutlery and laundry soap, are among other necessities. A first-aid kit must not be forgotten. At least one small waterproof package of matches should be carried by each member of the party.

A repair kit for the canoe is necessary, as it can be damaged quite easily when running rapids. It should include a can of marine glue, canvas patches, tacks and nails, coil of fine wire, and twine. If a hole has been made in the canvas or the planking of the canoe, the damaged part should be pressed back into position, well cleaned and then covered with heated marine glue. If a patch is required, the patch should be pressed well into the heated gum covering the damaged part, and then given another coating of hot glue.

Possibly the most traveled canoe routes are those in northern Ontario, where there are any number within easy call of civilization as well as in the more remote parts, the latter routes usually including James bay. There is plenty of good fishing on Canadian canoe routes, while the camera enthusiast can shoot all the pictures he likes in virgin territory.

LOCK FOR AUTO GASOLINE TANK PREVENTS CAR THEFTS

Protection of the gasoline tank from fuel thieves is made a simple matter by the development of a lock for the one part of the car usually left purely to chance. The lock can be fitted to almost any make of car, except Ford, and all are provided with different keys. Not only does the lock stop fuel thefts, but



acts as a great deterrent to car thieves, as the auto will, in most cases, be left in the owner's hands if the thief knows he cannot fill it with gasoline at any time.



Inventor Preparing to Fire Delayed-Ignition Flare in Test over the Open Sea

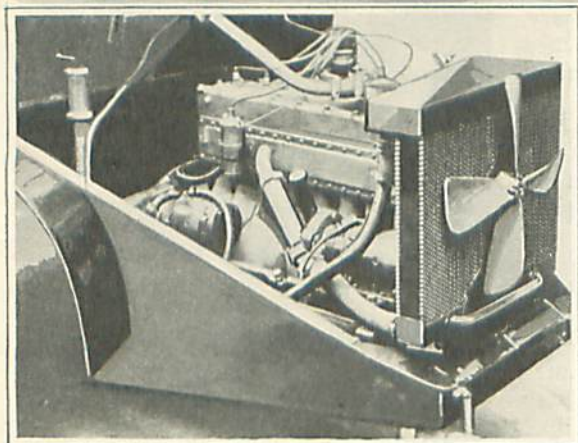
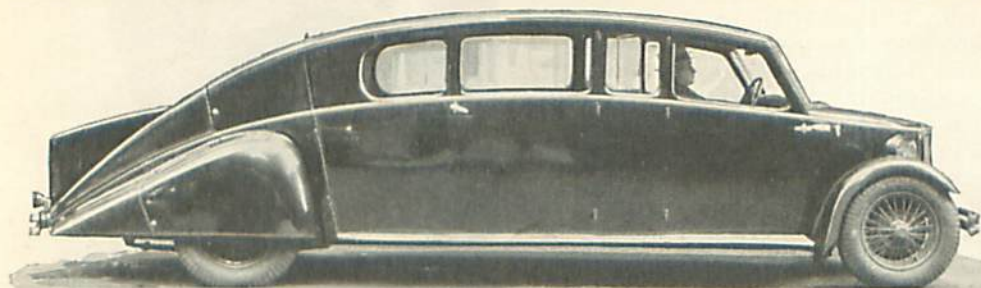
FLARE THAT DELAYS IGNITION CARRIES A GIANT LIGHT

Immensely powerful flares, ranging from 50,000 to half a million candlepower, which do not ignite until well in the air away from the projecting gun, have been developed by a British war "ace" and recently were taken across the Atlantic for a test far out of sight of land. The flares are said to be constructed on an entirely new principle, one feature of which is a special parachute attachment which keeps the flare in the air for as long as three minutes. The delayed ignition is considered particularly effective in warfare, as it does not give away the position of the plane, ship or observer firing the projectile. It is expected the new flares also will prove adaptable to use by civil airplane pilots who may find it necessary to make forced landings at night.

SELF-MEASURING SCREEN ROLL

Bolts of wire screen, with cloth tape lines rolled inside, measure themselves as the screening is pulled from the rolls. The tape is marked in feet and is strong enough so that it can be used after cutting of the screen for tying the section measured.

Rear-Motor Car Affords Comfort and Speed



Sir Dennistoun Burney's Streamlined Car and Its Rear-Mounted Engine; the Two Features Make It Virtually Noiseless

Sir Dennistoun Burney's streamlined rear-engine car, now being demonstrated to automotive engineers in this country, is attracting much interest. Sir Dennistoun is the designer of the British airship "R-100," and it was his researches concerning the movement of bodies at high speed through air and water which led him to develop the car. Many important advantages are claimed for it, including a lot more speed, greater hill-climbing efficiency and acceleration, ability to take turns much faster, improved riding quality, elimination of engine heat, odor and noise, marked reduction in wind noise at high speed, better ventilation, better braking and reduced fuel consumption. Some of these advantages are directly due to streamlining the body in ideal fashion, while others are results of his novel weight distribution or the rear position of the engine, or both. The streamlining accounts for the marked increase in speed, for better hill-climbing ability and better acceleration at the higher speeds. No figures have been given out, but it is prob-

able that, with a given car weight and engine power, the maximum speed would be twenty to thirty miles per hour greater. As an indication of how the greatly reduced wind resistance saves power—which means more speed and reduced fuel consumption—this car at seventy-five miles per hour requires only forty horsepower, while the conventional car requires seventy-five or eighty horsepower. The car is so silent that, in this respect, it can only be compared with an electric. So far as engine noise is concerned, there isn't any. The extreme-rear position of the engine simply eliminates noise and vibration insofar as the passengers are concerned. Wind noise is a serious problem in the conventional car at speeds of a mile a minute or better, and it is caused by the swirling and eddying of the air around the body. However, in this streamlined car, swirling and eddying are reduced to a minimum so that wind noise is no greater at eighty miles per hour than half that speed in the conventional car.

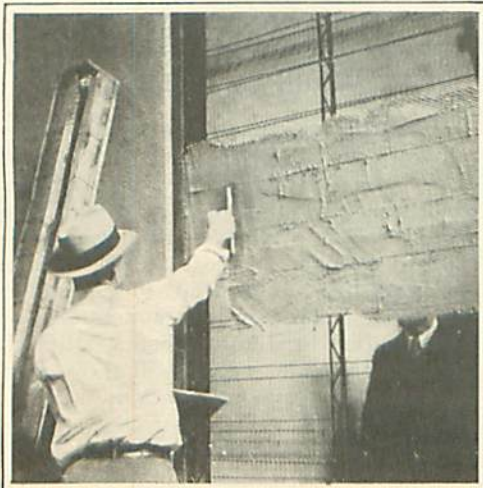
BRAINLIKE SYSTEM IN PLANTS FOUND NEAR LEAF TIPS

That plants have a sensitive system somewhat like the brain or nervous tissue in animals has been discovered in study of plant behavior at the Smithsonian Institution. An examination of seedlings showed that the curious phenomenon,

"phototropism," a tendency of a plant to bend toward or away from light, depends much on the section of the plant upon which the illumination is allowed to fall. A certain portion of the tip, or the leaf sheaf surrounding the bud of an ascending shoot, is capable of receiving a stimulus. If only one side of the seedling is illuminated, the stem will bend in the direction of the light, but the bending will take place toward the base. The action makes it seem that the tip receives the stimulus and the excitation travels downward to the "leg," the point where the bending takes place.

FIREPROOF STUDS FOR HOUSES ARE MADE OF STEEL

Fireproof studding for walls and partitions in houses and other buildings is being offered to replace the wooden article. The new studs, of light skeleton-steel construction, are fire-safe when covered with metal lath. Pipes and conduits can be run through the studding at any point. While the ordinary two-by-four wooden studs are easy to erect, notches must be cut and holes bored if pipes and conduits are run crosswise, weakening the stud. If flames get into the wooden partition, the studding is often set afire from top to bottom, the blaze sometimes breaking out again after firemen have extinguished visible flame and left the building.



Interior Finishing Material Being Applied over Metal Studs, Which Are Fireproof



Airplane Equipped with Wheel for Steering; Ailerons and Elevator Are Hooked Up Together

SELF-STEERING PLANE HANDLES LIKE AN AUTOMOBILE

Controls of a biplane that is virtually self-steering are attached to a wheel which enables a pilot using this invention to drive his ship like an automobile. Ailerons and elevator are hooked up together and bank the plane merely by turning the wheel, so that there is little possibility of going into a spin. If the ship is throttled back and approaches the stalling point, an electric control is brought into operation by wind velocity and the craft noses down automatically. All the pilot has to do is steer with the wheel and keep his feet on the rudder controls to hold the ship on its compass course.

ABRASIVES IN THE AIR

Dust and dirt flying through the air constitute a hazard to the high-speed airplanes today. When a ship traveling at a speed of 200 miles an hour or more comes into contact with these particles, they act as an abrasive with the result that ridges are often cut in the wings. Tests are now being conducted in an effort to find a wing material that will resist such abrasion and yet will be light enough for plane construction.

Flying Window Will Carry Thirty Passengers



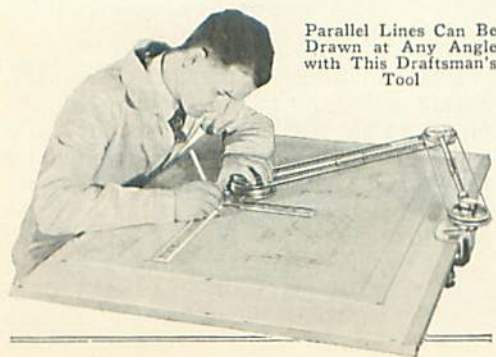
© Presse Photo

By Cutting Windows and Installing Cabins in the Wings, Designers Converted a German Freight-Carrying Craft into a Passenger Plane for Thirty; Note How the Body Was Raised above the Wings

Rebuilt to accommodate more passengers, a German plane will have cabins in its wings when it takes the air again. Window seats for thirty passengers have been constructed. This called for raising the body higher than the wings. Cabins in the wings were fitted with windows. The body of the plane is divided into compartments, one for freight and the other for dining, smoking and toilet rooms.

DRAFTSMAN'S TIME IS SAVED BY ALL-PURPOSE TOOL

Eliminating T-square, scale, triangles and protractor, a drafting machine has been developed that will draw parallel lines horizontally, vertically, or at any angle. In appearance somewhat like an artist's pantograph, it consists of two arms



Parallel Lines Can Be Drawn at Any Angle with This Draftsman's Tool

operating on swivels and capable of being clamped to the drafting board at any edge. It will bend at the elbows either right or left, the angle remaining the same and the tension being adjusted by knurled knuckles in the shafts. Each of the pulley wheels is mounted on ball bearings, so that the device can be moved over the drawing board with less effort than is required to slide a T-square or triangle. The protractor head is a full circle with five-minute vernier, and has a thumb catch to operate tabulated stops automatically.

STRESS METER BURIED IN DAM TO WARN OF COLLAPSE

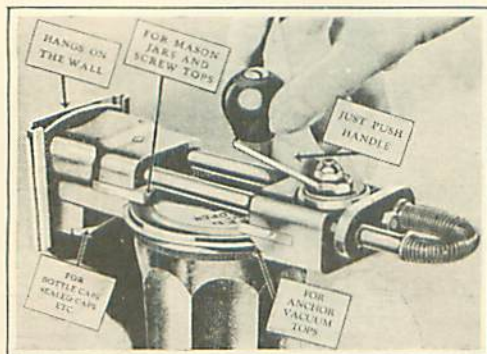
Measuring movements as small as one-millionth of an inch, stress meters buried in the Hoover dam will give warning of weakening parts in time to avert such disasters as that of the St. Francis dam in California, where more than 400 persons lost their lives. Hundreds of the meters will be imbedded in the concrete, with wires leading to a control room. Electric impulses from the meters will show operators the first signs of weakness inside the great walls. The meter is a stick of porcelain, nine inches long, wrapped with small wire. The whole is immersed in castor oil, to prevent corrosion of the wire, and inclosed in rubber.

LAKES SURGE LIKE PENDULUM OF A GIANT CLOCK

Started by various causes, usually uneven barometric pressure, the water of the Great Lakes surges back and forth in the manner of a giant pendulum. Such oscillations are known as "seiches" and keep going until stopped by friction or a new one is started by another impulse. While they have been observed on Lake Geneva in Switzerland and on the Baltic Sea, and are supposed to be common to all large inclosed bodies of water, it is only on the Great Lakes, and especially Lake Erie, that they have been the object of definite scientific study. The oscillation has nothing to do with wind waves, ripples or tides. It is a rhythmic rising and lowering of the level, varying from a fraction of an inch to a couple of feet, but the period between two highs or between two lows is always the same. On Lake Erie, the time is thirteen hours and six minutes for the full length of the lake. The eastern one-third of the water, however, is deeper, and here there is an independent seiche of three hours forty-two minutes.

ADJUSTABLE OPENER FOR CANS FITS ANY-SIZE LID

Adjustable jaws for a new can opener will fit any-size lid. The jaws are locked against the lid while it is being opened. The device also can be used for tightening



Any-Size Lid on Can or Jar Can Be Removed or Tightened with This Opener

the lid of sealed containers. A metal clip for attaching the opener to the wall may be used for supporting a grinder or fruit juicer.



Universal Joints on Controls Make It Easier to Steer Airships in Any Weather

AIRSHIP CONTROL MADE EASIER BY UNIVERSAL STEERING

With both nose and tail equipped with universal-jointed steering and elevator controls, "slipstream dirigibles" of a new design are expected to be put under construction shortly. Models of the new type are fitted, in addition to the usual fixed fins built into the tail structure, with a four-finned control which can be moved in any direction. Revolving of the surfaces, it is expected, will give additional stability in storms, and changes in the angle of the entire control structure simplify landing and take-off and make ground crews virtually unnecessary.

STRAIGHT ROWS INJURE CROPS

Recent tests of the department of agriculture have upset the old adage, "plow a straight furrow," if the furrows are in a sloping field. Straight rows in a sloping field provide nature with a drainage system that results in erosion, to the detriment of crops. Instead it was found best to make furrows following the contour of the land. Straight and curved furrows were plowed on one Kansas farm, and after a three-inch rainfall, the straight rows carried off two-thirds of the water but the others only one-sixth. A cultivating machine, which digs small holes at intervals, may possibly correct such erosion.



PET

crate was carried to a motor truck which carted it through the streets of a rickety and crowded city to a house in the suburbs. There, slats were split resoundingly from one of its sides. Alien hands lifted out the puppy and set him on the floor.

The room was glaringly bright. Also it was crowded with people who pressed closely and babblingly around the blinking newcomer. He was a brave little fellow, so he endured as best he could the nerve-racking climax of

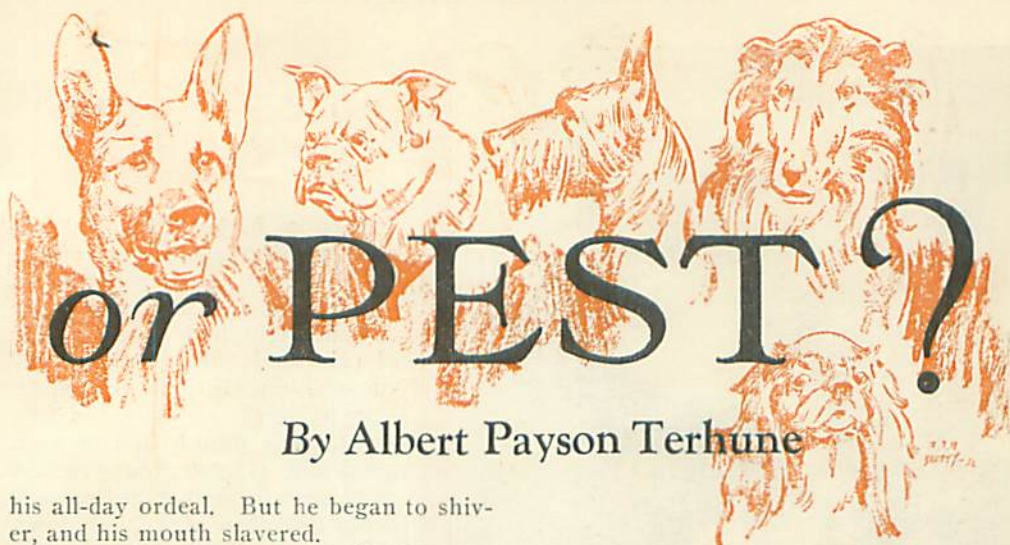
HE was only a baby; as much of a baby as though he had two legs and a soul, instead of four legs and a heart. During his three months of life, he never had been away from his gentle little mother and his pudgy brethren and sisters. The world had been bounded, for him, by the lawn where he and the other puppies romped.

Then he was picked up, without warning; thrust into a crate and driven over to the railroad station. Thence he was boosted aboard a noisy baggage car. For ten hours the little fellow rode thus; shivering in the bottom of his crate.

There were bread and milk in a dish fastened to one corner of his prison, and there was a tin of water. He drank often of the water, until it was gone. For fear and excitement, or any sustained ordeal, cause keen thirst in a dog. But he was too excited by the harrowing experiences to touch a mouthful of food. Then the



Top, a Wagonload of Puppies and Their Youthful Master; Below, a Wistful English Setter Pup



By Albert Payson Terhune

his all-day ordeal. But he began to shiver, and his mouth slavered.

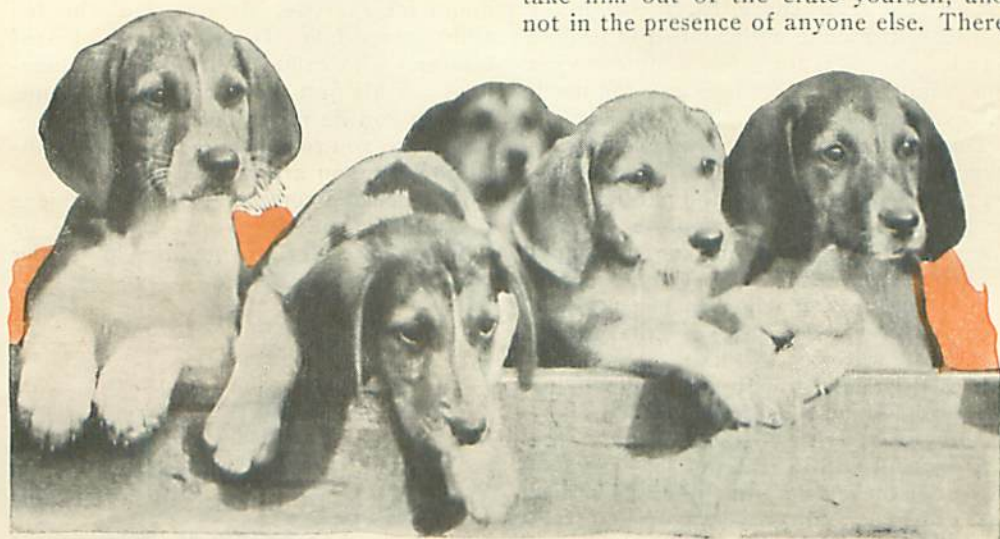
He was hopelessly confused. He was very far from home. He was in a new and terrifying world. He shrank instinctively from the barrage of strange petting and hugging. A dish of food was thrust at him. He turned from it. He was painfully thirsty, but nobody thought of offering him a drink of water.

"The brute is sick!" declared the man who had bought him. "I've been stung. These dog breeders are a bunch of crooks. Tomorrow I'll ship him back and tell the man who sold him to me what I think of him for palming off a diseased pup on me."

There is no point—no "snapper"—to

the true incident I have been telling. Nevertheless it was worth your reading, if ever you plan to buy a puppy, especially a thoroughbred. As to this particular puppy, he howled miserably all that night in the damp cellar where he had been tossed. Twice in the morning, his buyer came down to the cellar to slap and kick the homesick baby into silence. Next day he was shipped back home—where he lived happily for many a long year thereafter. He developed into a magnificent show dog, by the way, and into a peerless chum.

When the puppy arrives at your home, take him out of the crate yourself, and not in the presence of anyone else. There



Young Fox Hounds, Representing a Fine Example of Breeding for a Perfect Type of Dog



When This English Setter Was Asked to Pose for the Camera, He Oblingly Turned to Face the Photographer



Then go back to him, and talk more to him or take him out to the yard for another few minutes of mild exercise. During his first day and night, let him have plenty of calm and quiet, while he accustoms himself to his new home.

If he howls or cries the first night, don't punish him or even scold him. If your four-year-old child were to be snatched up suddenly and then were set down alone by night in an unknown part of the world, he or she would be very likely to whimper a little. Don't expect more from a canine baby than from a human baby.

Once or twice, during the night, go to his sleeping quarters and talk quietly to him, in friendly fashion, patting him and perhaps offering him a little food.

Do you get the psychology of this? Briefly, the pup was crated and sent far away, on a journey that seemed to him to last forever. It was you who freed him from that traveling jail. It was you who took him to the pleasant outdoors for exercise. It was you who fed and watered him. It was you who petted him and who came to brighten the loneliness of his first night away from home. It is to you he must look for everything. It is up to you to continue the process until, for life, you are his deity.

Patience and common sense will achieve the whole thing for you. Lose one or both of those glorious qualities in dealing

will be plenty of time, later, for him to meet the rest of the family. Take him out gently, talking to him even more gently as you do so.

If your house has a back yard or other inclosed outdoor space, carry the puppy thither—still alone with him—and let him wander around it for a few minutes to get the cramps out of his legs and for needful exercise.

During this time, don't try to romp with him or to excite him in any way. Keep on talking gently to him, and pat him once or twice. Already he is disposed to like you, nine times in ten, for most puppies or grown dogs feel an instinctive gratitude to the person who has just released them from a crate prison. See that he has cool fresh water to drink.

Presently, take him to whatever living quarters you may have provided. There let him rest; with a small dish of food near by and with a water dish. Let him stay undisturbed for some hours, while he dozes or rests and recovers from the train ride. Keep away from him, and let nobody else go near him.





with a dog of any age, and you have lost what you can't regain. In bringing up a young puppy, patience and common sense are 100 per cent necessary. There is no substitute for either of them.

Your six-year-old daughter would not progress fast in school if her teacher should shout at her and swear at her and beat her over the head and kick her. Such a teacher would land in jail. But you won't land in jail if you treat your puppy in that same unreasonable way. All the penalty you will incur is the ruin of the pup and the worse ruin of your self-control. If you can't control your temper, don't attempt to control anything or anyone else.

As to obedience, it is the nature of every puppy to be obedient. But nearly every puppy is at first careless or excitable or

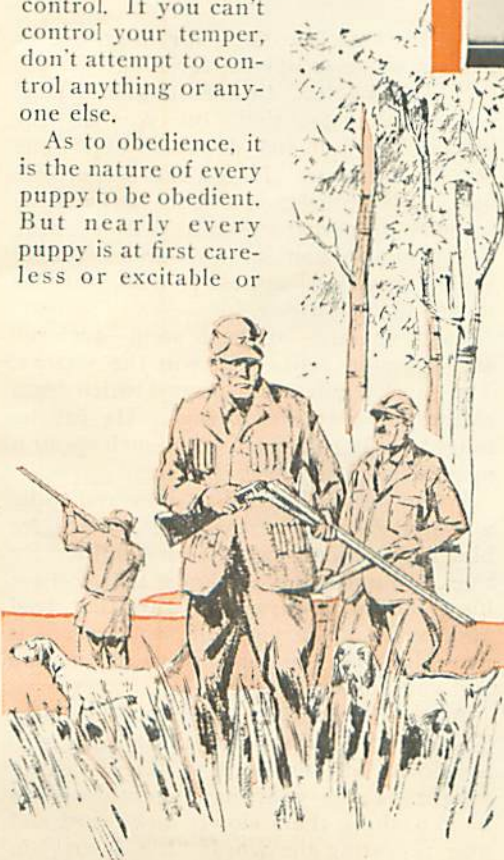


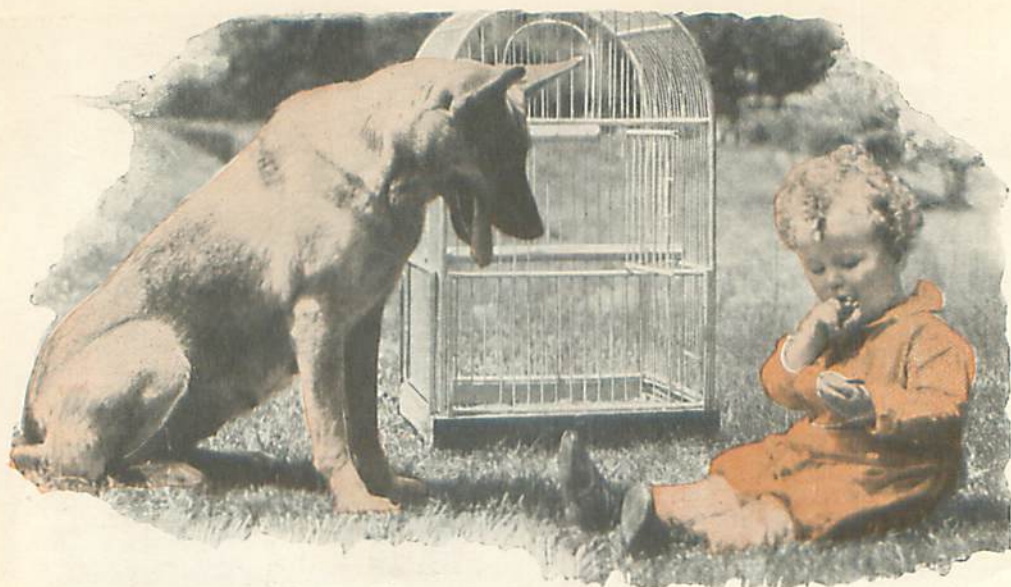
Pekingese, the Chinese Lap Dogs That Some Believe Are a Degenerate Breed of the Spaniel

playfully self-willed, and obedience develops in him by slow degrees instead of immediately. Here is where patience must come in. Let him see you are tireless in your effort to make his will conform to yours. Quietly, firmly, keep at it until he minds. Once he has grasped the lesson, he has grasped it for life.

Here at Sunnybank, in the biggest puppy yard, is what I call "the breaking gate." When I am training a puppy, I call him back into his yard, when his run and his romp are ended. As a rule, he comes willingly enough until he is within a few feet of the gate where I stand. Then he decides he is not going to be shut up in that yard, and he refuses to come farther.

Sometimes I stand there for a solid hour, quietly calling him by name; not shouting nor scolding, but summoning him in a steady and friendly voice. Soon or late he obeys the urge of my will against his own. Then, as he goes in through the gateway, I praise him extravagantly, hand him some tidbit as a reward, and altogether try to give him the idea he has done something mightily clever. Not





This Child Is Well Guarded by a German Sheep Dog, More Commonly Known as a Police Dog, Which Resembles the Wolf More Closely Than Any Domestic Breed of Animal

once in fifty times, after that, does a puppy disobey me.

There are many similar tests of obedience which any dog owner can work out for himself. But, keep it up, whatever it is. Never surrender. If you do, the pup has learned that your will is not law, and that he can tire out your endurance. You will thereafter be only his owner, not his master. There is a world of difference between the two words.

Once having won his obedience, the rest of his education is comparatively plain sailing. The next and hardest ordeal, in most cases, is to house-break him and teach him not to tear or destroy rugs or other furniture.

Some pups can be house-broken in a day; some not for long weeks. (Even as some children can learn to read in a day, while others take an interminable time over the task.) In house-breaking, more than in anything and everything else in his training, patience and common sense—especially the latter—must come into action.

In the first place, see that the pup is not kept indoors too long at a time. That is where common sense comes in. Let him out of doors at frequent and regular intervals. Soon, as a rule, he will learn to associate his needs with the outdoors,

and will scratch at the door to go out or will coax you to open it for him.

If you neglect this first glimmer of house-brokenness, then on you be the blame. The pup has done his best. The rest is up to you. If you fail to put him out at his request, you have set back his training by perhaps months. Worse still, if you punish him for transgressing after such a neglected appeal to you, you are not fit to own a dog.

Soon or late—oftenest soon—patience and common sense will win the victory. The same applies to a puppy which tears clothes or curtains or rugs. He can be taught easily to refrain from such wanton mischief, and to see it is wrong.

When he has learned to obey and to be a respectable house mate, it is time to let him make friends with your family. By then, ordinarily, he will know that you are his god. But always, even after that, feed and exercise him yourself, whenever it is possible. Let him continue to rely on you and you alone for everything.

As to tricks, I don't teach my dogs any. The one thing every dog must learn is to lie down at command. This is easily taught. Press your hand gently on his hips, pushing them slowly downward and ever repeating the words "Lie down!" in a firm but quiet voice. As he sits down

under this pressure, shift your hand to his shoulders, still repeating the words, "Lie down!" over and over. As the pressure at last makes him lie down, praise him highly for his supposed cleverness and pat him. Make him think he has done something fine. Dogs are almost as vain as humans, when it comes to praise.

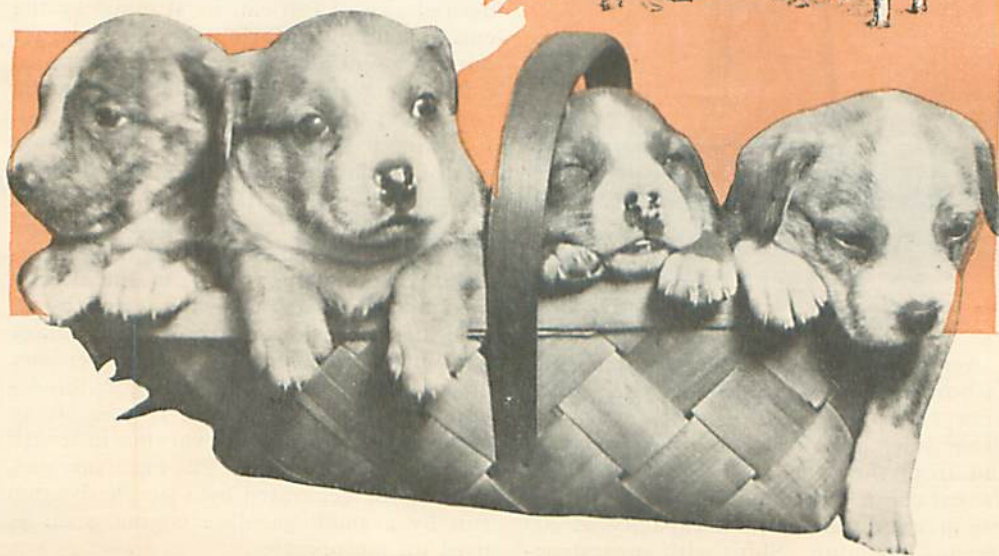
Repeat this treatment three or four times, the first day, and as often on succeeding days. Soon—sometimes in a mere day or so—he will have learned to associate the gentle pressure with the ever-recurrent command, "Lie down!" and he will lie down, without the touch of the hand, at first sound of the order. When this is thoroughly taught, it is simple to teach him to lie down in any spot to which you may point, or even to make him lie down by a mere gesture of one finger and without speaking a word.

In similar fashion you can teach him to lie on guard, protecting any object you may place in front of him, or to guard your car when you leave him in it alone. The innate watchdog instinct is at work in such cases, helping your teachings.

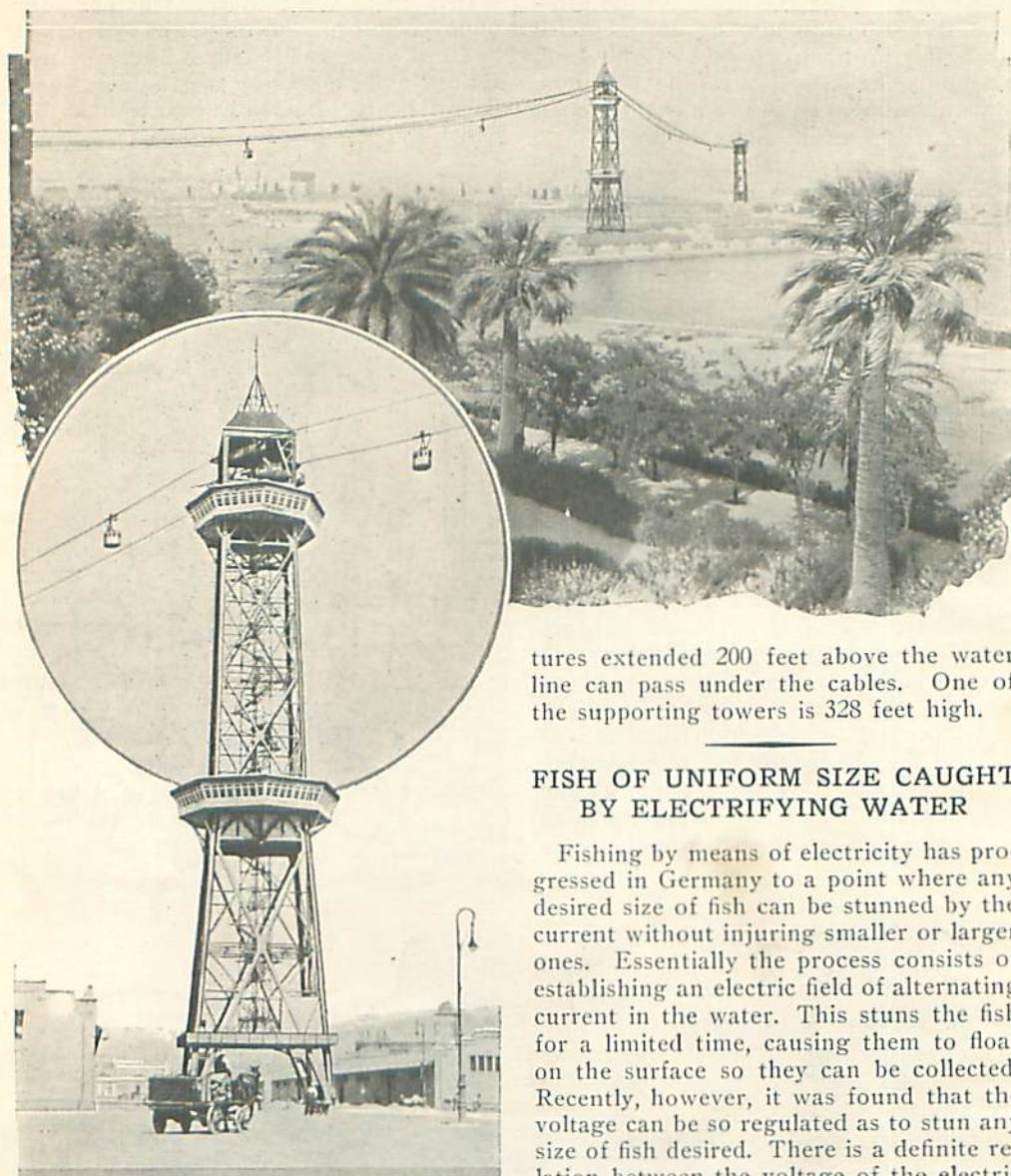
As to breeds of dogs, everyone to his or her taste. All dogs of whatever breed can be trained into good chums and housemates if they be rightly taught while they are young, and if patience and common sense are unflinching. At heart, your dog is more anxious to learn than you are to

teach, but don't confuse or scare him by overlong lessons at any one time.

It is up to you to decide whether your puppy is to grow into a pet or a pest. It is all in your own hands. Many a well-trained child grows up worthless. Never have I heard of a really well-trained dog which did so.



Aerial Trains Speed Across Harbor on Cable



Top, Suspension Cables over Barcelona Harbor; Below, Two Passenger Cars and a Cable Tower

Aerial trains carry passengers across the harbor at Barcelona, Spain, suspended from cables attached to tall towers on either side. Elevators take passengers to and from the tops of the towers, where the cars stop. Four of the one-car trains are in operation, with a capacity of 300 persons per hour. Ships with superstruc-

tures extended 200 feet above the water line can pass under the cables. One of the supporting towers is 328 feet high.

FISH OF UNIFORM SIZE CAUGHT BY ELECTRIFYING WATER

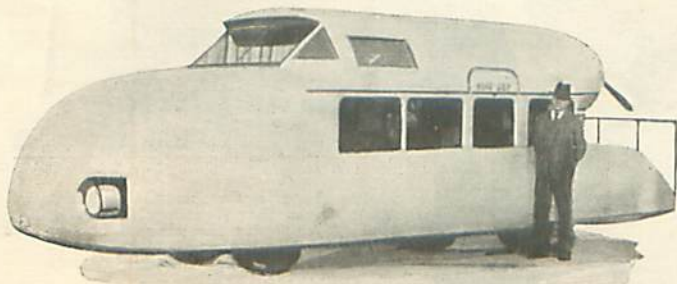
Fishing by means of electricity has progressed in Germany to a point where any desired size of fish can be stunned by the current without injuring smaller or larger ones. Essentially the process consists of establishing an electric field of alternating current in the water. This stuns the fish for a limited time, causing them to float on the surface so they can be collected. Recently, however, it was found that the voltage can be so regulated as to stun any size of fish desired. There is a definite relation between the voltage of the electric field and the size of fish affected by it. The smaller fish stand a higher voltage without visible effect while the larger ones are numbed by very low voltages. So accurate is this rule that it is possible to confine the catch to fish varying in length only one or two inches. The necessary current can be generated by a simple dynamo run by a small gasoline engine, such as used on motorcycles.

MATCH-BOX CAMERA POSSIBLE WITH PHOTO ENLARGEMENT

Enlargement of photographs to sixty times the original size, a process developed by Dr. Miller Reese Hutchinson, makes practical the manufacture of cameras no larger than a penny match box. Such a camera, says Doctor Hutchinson, would hold enough film to make several hundred exposures without reloading. After the film is developed, the magnifying process produces a picture many times larger without loss of detail. The secret of the process lies in the virtual elimination of "grain" in photographic film, which, when enlarged more than four diameters by the present method, blurs and distorts the image. Doctor Hutchinson's process can be applied to motion pictures, telephoto, aerial and astronomical photography.

AUTO IS BUILT LIKE A ZEPPELIN FOR BROADCASTING TOUR

Built like a Zeppelin and capable of being propelled by a regular air screw, an automobile has been designed in Iowa to carry radio artists on a "booster" tour. The road Zeppelin is equipped with powerful loud speakers and will broadcast directly from the studio within the car. It is mounted on a standard chassis and, in ordinary operation, is driven by the usual auto powerplant. The propeller is powered by an airplane engine, however, and will push the car at a speed of about twelve miles an hour when desired. A third engine is mounted inside to provide power for the generators of the broadcasting plant. The over-all length of the vehicle is twenty-five feet.



Shaped Like a Zeppelin, This Auto Carries Radio Entertainers and Equipment for Road Broadcasting; It Is Propelled by an Air Screw



Modified Form of Bowling Which Requires Little Space, Since No Alley Is Needed

BOWLING GAME FOR THE HOME REQUIRES NO ALLEY

Bowling in your back yard, or even on the dining room table, is made possible with a variation of the game which requires no alley and hence can be enjoyed in a restricted area. The pins and the scoring are the same as for the alley game. The ball, however, is suspended by a cord from an arm overhead. The player stands in the position of the pin boy in the ordinary game and swings the ball from the hand in such a manner that it goes around a stake and strikes the pins on the return. If the ball touches the stake, the pins that are knocked over are not counted.

¶The people of the United States spend \$715,000,000 annually for drugs and medicines.

FALSE FACES *for*



Gas Masks Were Brought into Prominence during the World War, but They Are Used Today in Many Peacetime Industries; at Left Is the "Polar Bear," Which Protects against Dust



Above, Right, the Atom Filter; It Is Well Suited to the Battlefield as Being Very Effective against Gases Used in Warfare; It Is Worn in a Protective Covering



One of the Masks Employed in Industry as a Protection from Dust; It Covers the Entire Head and Fastens about the Neck, Keeping Dust Out of Eyes and Filtering the Air



Above Is the Carbonic-Oxide Mask Which Gives the Wearer a Terrifying Appearance; It Is Employed in Gas Works, by Fire Fighters and by Engine Crews When Passing through Tunnels

EVERYONE



On Account of the Glasses It Wears, the Mask at the Left Has Been Given the Name, "Swiss Spectacles": It Is Employed as a Protective Covering by Industrial Workers, but Has Also Found Favor with Burglars Who Have Used This or a Similar Form to Conceal Their Features When Committing a Crime



Above Is the Asthma Mask Worn by Persons Suffering from This Disease; It Removes Impurities from the Air That Is Drawn through It



This Might Be Called a Family Photograph of the Future, Depicting the Time When Everybody Wears Masks; Grouped in the Picture Are Various Types Used in Both Industry and Warfare; Some of Them Filter Dust, Some Stop Gases and Others Remove Impurities from Air

Racing Drivers Keep Goggles Clean with Powder Puff Sewed to Gloves

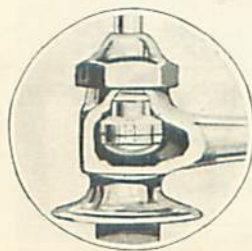


RACE DRIVER'S POWDER PUFF KEEPS GOGGLES CLEAN

For years, the problem of keeping goggles free from dust, dirt and oil worried racing automobile drivers. Then one of them found that a powder puff was much better for that job than waste, and other drivers now include the puff in their racing equipment. "Howdy" Wilcox of Indianapolis has one sewed to each driving glove. When his goggles get dirty, he lifts one hand and wipes the lens with the puff on the back of the glove. Other pilots attach puffs to their steering wheels with elastic bands so that they snap back into place when released.

FAUCET VALVE LASTS LONGER BY REDUCING FRICTION

Designed to "float," so that the twist of the valve shaft will not cause it to grind on the edge of its seat, a metal faucet valve has been produced to give extremely long life. The valve acts on the vacuum-cup principle. When pressure of the handle shaft is released, the water forces the cup off its seat, while the turning motion of closing the valve is all absorbed by the floating member. The valve is self-centering and the head is of a special design that



will stand indefinite heating and cannot be readily crushed, cut or torn. It is said to be more quickly installed than the usual washer type of valve, and by any unskilled person. It is also said to save the cost of frequent reseating and of ruined faucets.

WELDING BY RADIO FREQUENCY REDUCES HEAT LOSSES

Heat losses in welding are reduced by a new process in which high-frequency electric current is used. This current is like that used in radio. The process depends upon the fact that high-frequency currents are most intense on the surface of a conductor. The plates to be welded are brought together and connected by a wire. A high-frequency current is passed to the plates, accumulating at the outer edges to be welded which are subject to melting heat. Other parts of the conductor remain cool. Seamless pipes will be manufactured by this process.

TRAP TO LURE FRUIT BEETLES BY USE OF SCENT

Twelve to fifteen thousand Japanese beetles are trapped easily in six to eight hours through the use of a new pest destroyer recently developed. It acts just as efficiently against fruit flies and moths in orchards, merely by changing the bait scent which attracts the insects to their destruction. The bait is not impaired by the hardest rain, while the scent is sufficiently attractive to draw the beetles a mile against the wind. The Japanese beetle thrives particularly during the hot weather, since the eggs are hatched in the warm ground. The trap, for use against Japanese beetles, is painted green and white, those being the colors most attractive to these insects. Even field mice and moles have been successfully lured by the device by incorporating a different scent.

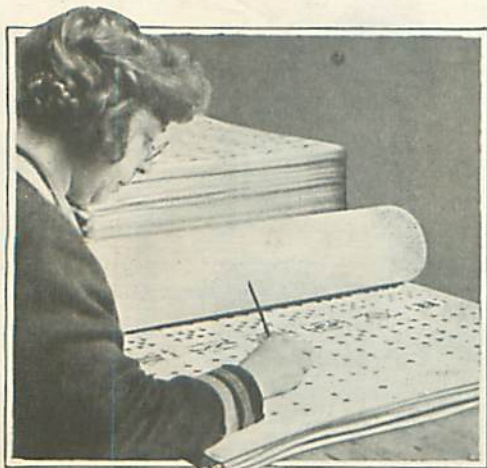


RUBBER MADE FROM MINERALS IS GOOD SUBSTITUTE

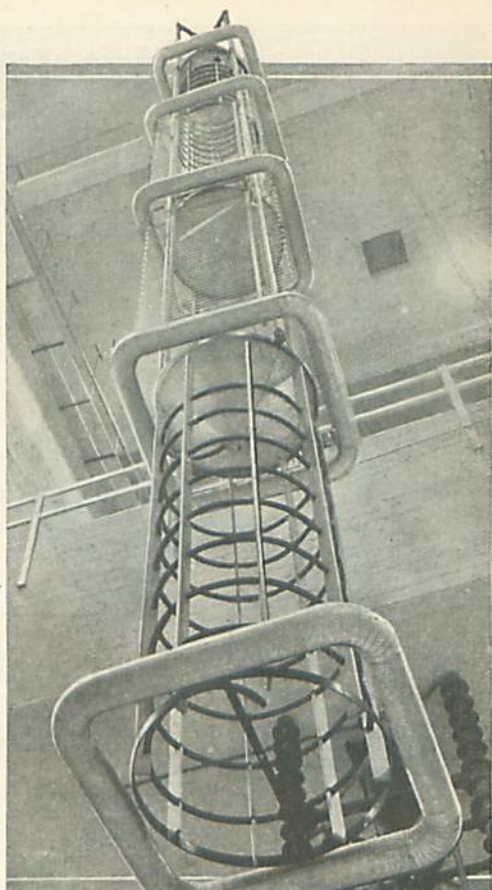
Rubber made from minerals, with such basic materials as limestone, coke and ordinary salt, is a good substitute for the natural product. While the price is slightly higher than the present price of rubber, refinement of manufacturing processes is expected to place the artificial rubber on a competitive level. Samples do not swell or deteriorate unduly when soaked in gasoline for days, proving its superiority to the natural rubber in that respect. Another advantage is that the new material cures without the addition of sulphur or other foreign bodies to aid in vulcanization. The artificial rubber has the appearance, feel and stretch, but not the odor of the natural product. Since the minerals from which the artificial material is manufactured are plentiful in the United States, this country may be freed of dependence on outside sources for rubber.

A CENTURY OF PLAYING CARDS TO BE OBSERVED

Skill of the playing-card maker will be celebrated by an English company which ends a century in the business this year. The preparation of the designs and plates from which cards are printed is a highly skilled craft. Every board of cards is examined after printing to remove spots and correct defects before the cards are cut out and assembled in decks.



Artist Touching Up Imperfect Designs on Sheets of Playing Cards before Cutting



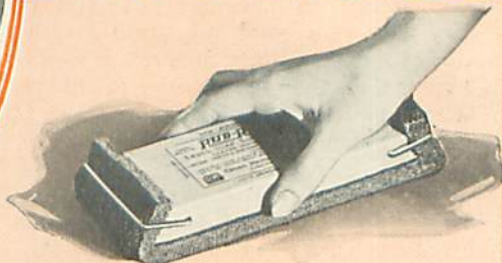
Glass and Rubber Tubes in Framework of Giant X-Ray, Are Filled with Water for Cooling

X-RAY THREE FLOORS IN HEIGHT COOLED BY WATER

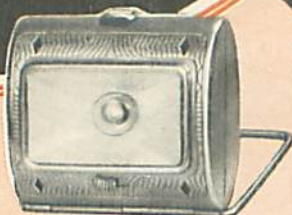
Water not only conducts the extremely high current but acts as a "safety valve" as well, in connection with what is said to be the world's largest X-ray tube at the California Institute of Technology. The giant tube is three floors high and is surrounded by a queer-looking column of rubber and glass tubes. The tubes are filled with water, which acts as a resistance, carries the current to the high-frequency lead, and acts as a safety valve against arcking, or artificial lightning, so common and so dangerous in connection with high-voltage experiments.

☐ The average cost of new tires to American motorists today is fifty-nine cents per thousand miles, compared with \$5.67 in the year 1914.

MAKING HOME



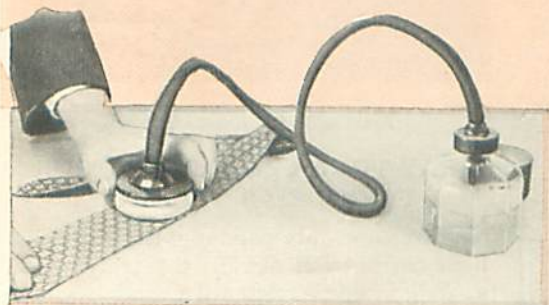
Above, Scrubbing Brush with Sponge-Rubber Pad Instead of Bristles; Soap Is Inserted between the Rubber and the Wood



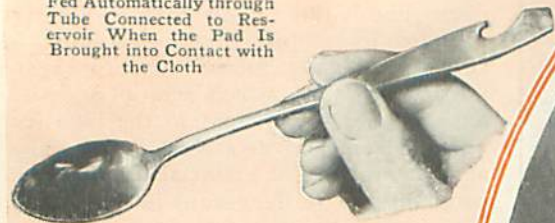
Left, Vest-Pocket or Purse-Size Flashlight; It Is About the Size of a Cigaret Case and Can Be Hung on a Hook or Set on a Table



Above, Elastic Shoestring Which Makes It Possible to Remove Shoe without Unlacing It



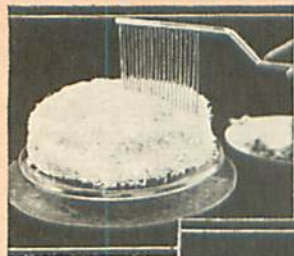
Above, Dry-Cleaning Pad Fed Automatically through Tube Connected to Reservoir When the Pad Is Brought into Contact with the Cloth



Above, Mixing Spoon with Bottle Opener in Its Long Handle; Right, Refrigerator Door Opened by Stepping on a Pedal at Its Base, Thus Leaving Both Hands Free



TASKS A PLEASURE



Above, Cake Breaker That Slices without Crushing, Leaving the Frosting and Filling Entirely Intact



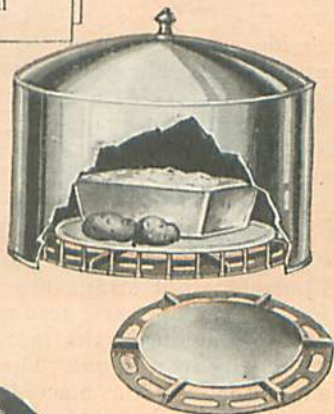
Above, Wire Spring Necktie Presser That Restores Cravats to Their Original Shape without Ironing



Above, Rubber Washboard with a Surface of Ball-Shaped Knobs, to Be Used for Lingerie or Hose as the Rubber Does Not Tear Threads or Injure Material



Right, Cooking Plate and Cover Which Forms a Small Oven and Can Be Used on Any Stove



Left, Portable Exerciser That Takes Up Little Room in a Traveling Bag and Can Be Set Up for Use Quickly in a Restricted Space



Scooter, Like Roller Skate, Has a Hand Grip and Brake to Make It Safer for Children

ROLLER-SCOOTER WITH BRAKE SAVES SHOE LEATHER

Safer play, with a big saving in shoe leather, is made possible with a toy recently developed, a scooter that resembles a roller skate. Extending upward from the scooter is a heavy twisted-wire handle bent at right angles at several points to provide grasping places for children of varying sizes. The braking mechanism consists of a flat plate which is pressed against the top of the wheels by the free, or pushing, foot of the rider. The lever extends to the side of the scooter and is held off the wheels by a heavy spring when not wanted. Adjustable foot straps are provided, which, once set, need never be moved again, as the foot will slip readily in and out. The toy can be used either as a scooter or coaster, the brake making its latter employment completely safe.

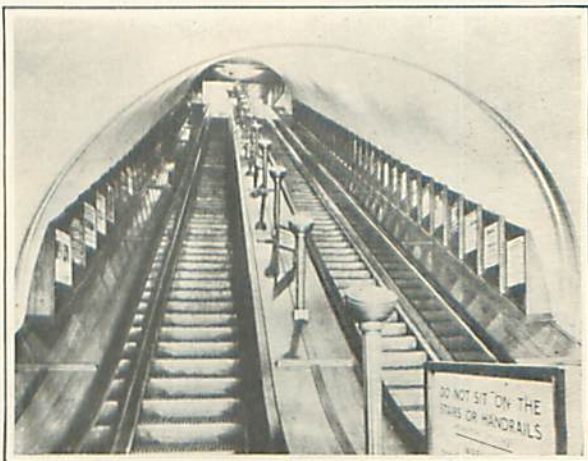
Names and addresses of manufacturers of articles described in this magazine will be furnished by our Bureau of Information.

METAL IS BONDED WITH FELT TO DEADEN SOUND

With the aid of heat and pressure, metal has been bonded with felt in a single sheet at the Mellon Institute of Industrial Research, at Pittsburgh. The new felted sheet will not only enable engineers to obviate the metallic ring of steel, but by saturating the outer felt surface with paint, lacquer or rosin, prevent corrosion as well. Protection of the metal from acid fumes and gas is foreseen as an important result. By combining asbestos felt with the metal and saturating the felt with the proper material, fireproofing is attained. The bond is so strong, under the new process, that a felted metal surface can be drawn, rolled, sheared, corrugated or bent just as if it were ordinary steel.

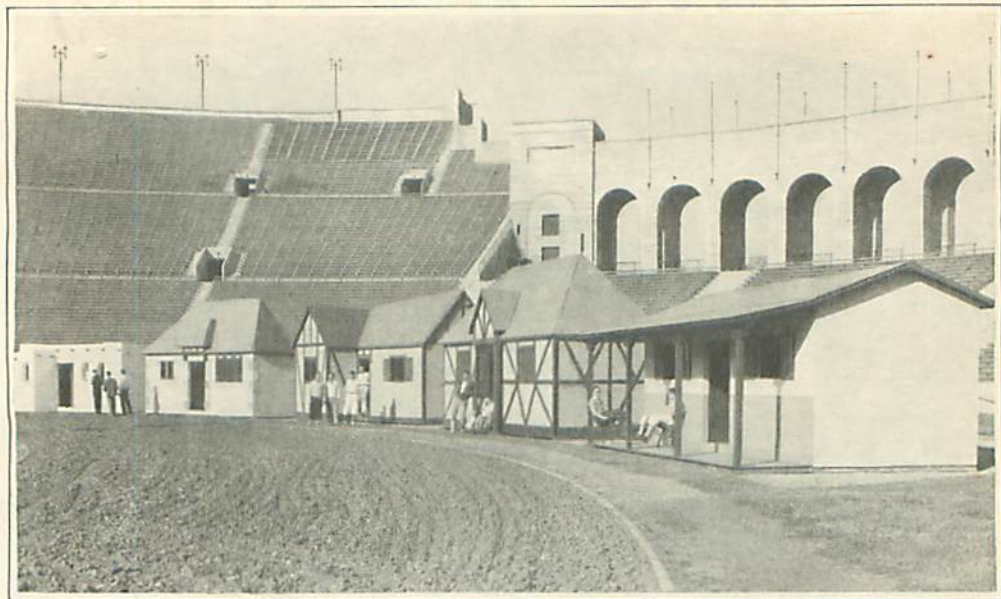
FAST ESCALATORS IN SUBWAY CARRY LONDON TRAFFIC

Moving stairways, or escalators, twice as fast as those used in the United States, have been installed in the London subway to speed up traffic to and from the trains. The machines travel 180 feet per minute and are capable of carrying 16,000 persons an hour on inclines of from twenty-four to ninety feet, another new record for escalators. Increased safety is claimed by the London subway operators in that the rush-hour traffic can be handled much more quickly than was possible under the old stair-climbing method.



Fast-Moving Stairways Carry 16,000 Travelers an Hour to and from the London Subway in Rush Hours

Portable City Is Built for Olympic Athletes



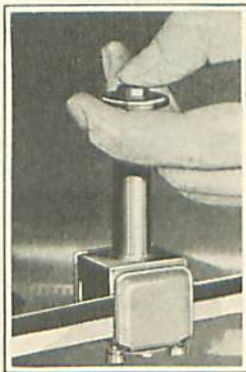
Some of the 800 Portable Cottages Which Will House 3,000 Athletes Participating in the Olympic Games at Los Angeles; Each Building Has Accommodations for Four Persons

When the 3,000 male athletes assemble at Los Angeles this summer for the Olympic games, they will find awaiting them a small city consisting of 800 portable buildings where the contestants will live during the period of competition. The temporary town is one-half mile square and all the buildings were fabricated at the lumber yards in complete sections and set up on the Olympic village site. The structures are in various designs, but each cottage is ten by twenty-four feet and consists of two rooms to accommodate four men. Each has a separate vestibule entrance, a private door to each room, showers and a porch. There are also baths, administration buildings, a medical center, transportation buildings, entertainment facilities, seven dining rooms and kitchen units and a fire house, all of them temporary structures. For each building there were 1,500 pieces of lumber to be nailed in place, none over ten feet long except the ridgepole for the roof. In all, 110 different details were nailed together at the lumber yards, the houses being assembled at the site by bolting the sections in place. The cottages are to be salvaged after the games, taken apart and then sold

as summer homes, mountain cabins or seashore houses, or two rooms can be added to make a permanent dwelling.

TYPIST RENEWS OWN RIBBONS WITHOUT REMOVING

Typewriter ribbons are renewed quickly right in the machine with the aid of a device recently placed on the market. Cost of ribbons is cut, the annoyance of constantly changing them is ended and dim and indistinct letters are made bright and full-colored. The ribbon first is rolled all on one spool. Then the renewing apparatus is fitted between the spools, and as the ribbon is rewound to the



other side, a plunger feeds a special fluid into an applicator. This softens and spreads the ink in the ribbon.

... The PORT of



By WILLIAM J. BURNS

Internationally Known Detective

JUST now, when there is much discussion regarding kidnappings, many wealthy families are taking one inexpensive precaution that should be adopted by every family in America. The well-to-do are having their offspring fingerprinted.

What is the advantage of this? Well, suppose after years have elapsed the parents of a baby, stolen and never recovered, are asked to believe that some half-grown waif is their lost one. It has happened before and will happen again. There is only one positive way to establish whether the candidate for admission to their home and access to their purse is really their child. That way is by a comparison of fingerprints. Yet how few persons have weighed the need for considering this matter!

Nevertheless the terrible possibility we are considering is something that just now is disturbing the minds of many parents. In recent weeks, the fingerprint experts of my organization have gone into the homes

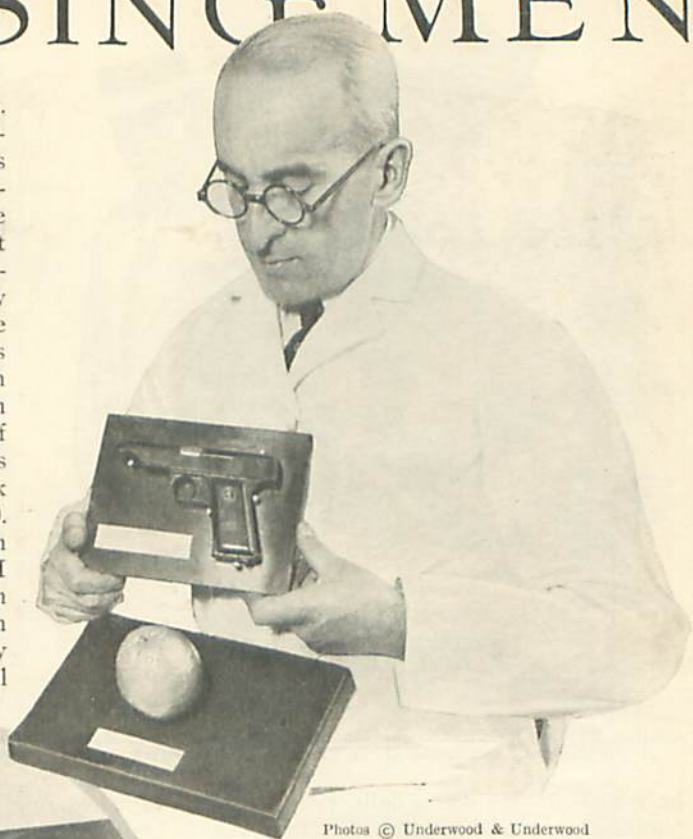
of a number of my richest clients and made impressions of the ridges on the fingers, hands, feet and toes of their youngsters.

The patterns of those ridges will not alter throughout life in spite of growth. When these children have become grandparents, the design of the markings will be the same, an absolute control of the otherwise baffling problem of identity.

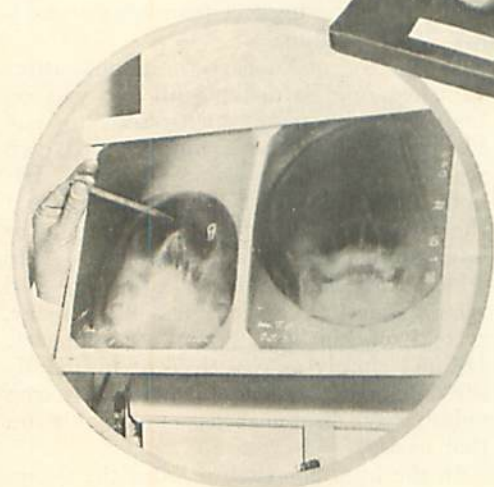
In each case, we have left one set of these impressions with the parents to be cherished with other important family documents; another set is filed in our own records. The kidnapping of infants is just one possibility that must be considered in this matter. Any detective, and Capt. John Ayres of the New York police department in particular, will tell you that a great many heartaches might be saved if all in this country were fingerprinted and if those prints were indexed in one great national library. And, after all, no honest man has anything to fear from always be-

MISSING MEN

ing tied to his true identity. Captain Ayres is in command of the missing persons bureau. More than fifty detectives under him devote all their energies to the hunt for persons who have mysteriously disappeared. Few are aware of the magnitude of the army of Americans who vanish strangely from sight of friends and kin each year. The annual number of mysterious disappearances reported to the New York police is more than 9,000. Weighing this with my own professional experience, I am convinced that the sum of such cases for the nation represents a yearly mystery as great in its mass as if all



Photos © Underwood & Underwood



Top, Reproduction of Gun and Orange by Process Which Aids in Identification of Articles; Below, X-Rays of Sinus Passages for Identification Purposes

the inhabitants of El Paso, Tex., were to drop from sight. The world is kept aware of the voids left by the disappearance of Justice Crater, of Dorothy Arnold, and other widely publicized cases. Not many stop to estimate that since Dorothy Arnold melted into a sidewalk throng in

1910, at least 2,000,000 have disappeared in the nation for a long or a short while. That is enough to populate a city the size of Philadelphia.

I have followed the trails of many vanished persons. Sometimes they lead to the ends of the earth, to nameless graves, to prison cells, to hospitals and asylums. Houdini, causing an elephant to disappear in one of his stage illusions, created only mild wonder compared with the complete bewilderment of a family when a member vanishes. Do they ever cease to scan the faces of all strangers, hoping that each fancied resemblance will focus into the features of the one they seek?

There is an old woman who comes every week to police headquarters in New York. She has been coming for nine years, at first a buxom fresh-faced woman, but now thin, withered and gray. It is her son who is missing. By now he would be twenty-three; he was fourteen when



Officials Hunting for Clues in the Lindbergh Baby Kidnaping, Making a Minute Examination of the Ladder That Was Used

he vanished. He was a delivery boy for a manufacturer of imitation jewelry. Was he murdered for the sake of false gems? Or did some joker in the plant trick him into believing the bag he carried was filled with real jewels and transform him into an absconder? All I know is that his mother's hope he will return is kept alive by a chart that hangs on the wall at police headquarters. It is a tabulation of more than 100,000 disappearances reported in a period of seven years. Nearly ninety-eight per cent of the cases were closed. The missing persons were found. Year after year it is the same, only two out of each 100 cases continuing to be mysterious disappearances; and the police never stop looking for the others.

Whether you live north, south, east or west, the police of your city will tell you that, contrary to popular belief, the majority who disappear are not girls and not juveniles. The ratio is three masculine disappearances to each two feminine cases. Most people who disappear plan to do so and often create false clues designed to

fool those who would track them. In Iowa, a few years ago, the relatives of a man whose burning automobile was found on a lonely road, buried as his the corpse that was behind the wheel. Afterward it was found the charred body had been embalmed! The body had been stolen from a grave yard. Was the man trying to swindle an insurance company or trying to escape vengeful criminal associates?

Out on Long Island, some time ago, the finding of an automobile with bullet holes in the top suggested that the owner, an overseas veteran, had been murdered on the eve of his marriage. Through fingerprints on file in Washington, he was afterward found to have joined the marines. He was simply a fugitive from his own wedding.

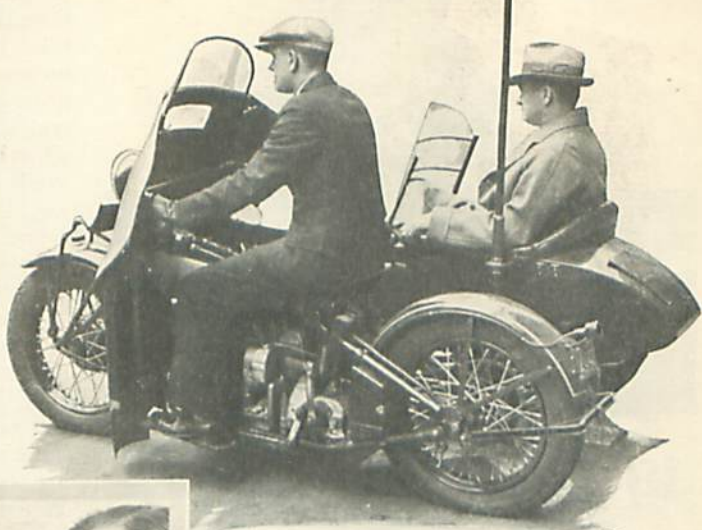
An eastern manufacturer vanished one Saturday while he was on his way to his factory with \$7,500 to pay his employees. Then a note came which read: "We had to bump him off. His body is in the river." It happened that the river was full of ice. Many months later a member of a fraternal order to which this man belonged, and who had seen his picture on a circular in the lodge, recognized him in a Texas city ball park. He had simply grown tired of his family life. Selfish! The mystery of many who voluntarily disappear is explainable on that basis.

In the hunt for such persons the detectives should be given all possible information about their life and character. Always the task is to find out what they were thinking about before they disappeared. We had a case once in which the withholding of a slight clue delayed success for over a year.

The man, kinsman of his employers, was foreign buyer for a department store in a small town in the Great Lakes region. He started abroad with \$50,000 on a buy-

ing trip. We found he had walked out of a New York hotel room leaving all his possessions. The brush with which he had prepared his face for shaving that morning was still creamy with lather. A police clerk up in Saskatchewan, Canada, recognized him from a circular photograph we had distributed. What chagrined us was to discover that his family had found marginal annotations of his in a book he had read, which were a broad hint that he had taken a fancy to the name of one of the characters in the novel.

Police Motorcycle Equipped with Radio to Combine Speed with Rapid-Communication Facilities; Below, Large Aluminum Reproduction of Bullet Fired by a Slayer



steps are helpful when the missing one is deliberately disappearing. What about the other kind?

There is a constant exchange of information between the various police departments of the country as they seek to find the missing for distracted relatives. In a recent three-day period the missing persons bureau in New York received requests for aid in finding missing ones from San Antonio, Dallas, Pittsburgh, Montreal, Southampton and Birmingham, England, Tientsin, China, and a dozen other scattered places. All cities have this problem, but New York handles it with exceptional skill.

As a clearing house of lost identities the missing persons bureau appropriately includes as a major function the problem of naming the city's unidentified dead. Death at least a thousand times a year overtakes some person in the city who is out of touch with family or friends. The same problem exists in every city, and everywhere it provides strong support for my argument that all of us should be fingerprinted, especially the babies and children.

It is my notion that kidnaping is going to be less and less a reason for fingerprinting, however. Lately I have been advising all my clients and friends to caution their children against accompanying

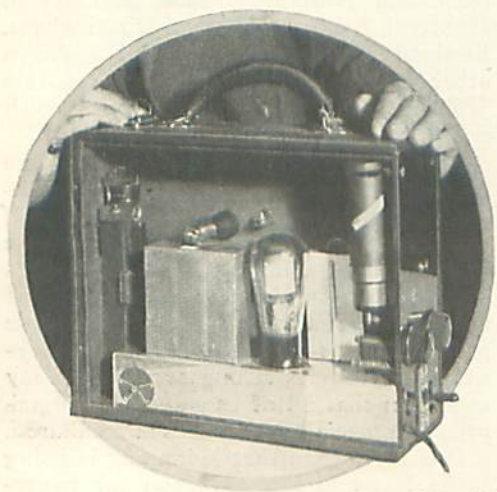
That was the name under which he was living when found in Canada!

Circulars are one of the best aids in finding a missing person when all other clues fail. Did the man or woman leave in an automobile? Then send a circular, bearing a reward offer, to all auto-license bureaus and main-traffic-artery filling stations. Hotels? Six thousand circulars will do the trick. Is the person likely to go abroad? File a photograph with the passport bureau in Washington. These



Above, Demonstration of Metal Detector, Shown at Bottom of Page, Which Sounds Alarm When an Armed Person Approaches

strangers, regardless of circumstances; to caution all who are entrusted with children—governesses, nurses and teachers—of the subtle subterfuges used to secure the possession of children; likewise to warn them of the importance of a proper investigation of all servants. Actual phys-



Photos © U. & U.

ical protection is the best safeguard of the sort, of course, but what the country needs

is more punitive laws to deal with kidnapers.

I believe that kidnapers should be put to death. I do not believe that the authorities are justified in conniving with a family, no matter how grief-stricken, in promising immunity to kidnapers. That works an injustice to all other children, for it persuades the vicious of the underworld that kidnaping is a safe crime. We should make it the least safe of all crimes if we love our children.

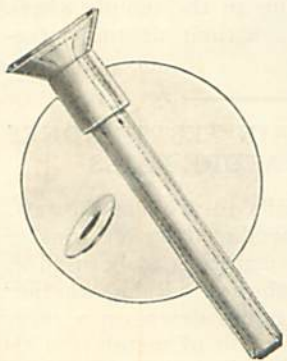
What sort of law? Let the federal government step in here and say, among other things, that the use of the mails to collect ransom shall be punished by hanging. And when kidnapers are caught, hang them quick. When we make a practice of doing that, then none of our missing persons will be kidnaped children.

BOILING INTERIOR OF EARTH STIFF AS GLASS

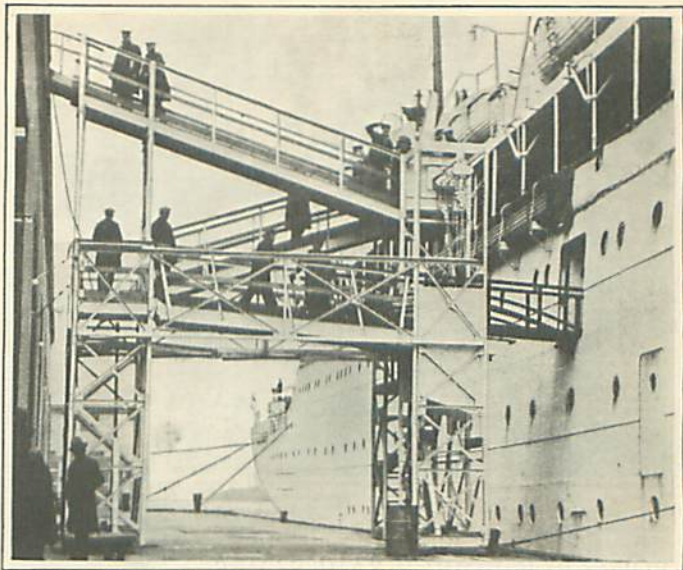
Old Mother Earth is "boiling" like a soup kettle, with the continents floating on the surface like flakes of scum. That is the theory of Prof. Arthur Holmes, of the University of Durham, England, to account for the rate at which the earth is losing its heat. The soup, he explains, does its boiling in terms of millenia, rather than minutes, and is thousands of times as stiff as glass, so its movements naturally are slow. Lord Kelvin, English physicist, made an effort two centuries ago to calculate the age of the earth from the known rate of heat radiation. He assumed an originally molten globe, with no energy beyond the original dowry it brought with it from the sun. On this basis, he allowed a maximum age of 40,000,000 years, but geologists and evolutionists protested this was entirely too short. This impasse lasted until radioactive elements were found in the earth's crust to account for an accessory supply of energy, but there still remained the problem of transfer of the interior heat to the surface. Prof. John Joly, of the University of Dublin, has held

that waves of thermal energy start from the interior and work outward through a semi-fluid mass. Each wave liquefies the zone through which it moves, and, as it passes, leaves it solid again. Professor Holmes' soup-kettle hypothesis visions a movement of the interior itself, carrying the energy with it. The interior mass, he thinks, may be sufficiently fluid to move with slow convection currents, rising in the equatorial regions, flowing along at the surface just beneath the solid crust, and sinking again at the poles, to begin the cycle anew. There are also other currents, he believes, and he conceives these currents as taking a grip on the bottom of the earth's crust and pushing it about, splitting continents apart on the sides toward the poles and pushing outer margins into wrinkles, or mountains.

GUAGE FOR FORD VALVE STEMS MAKES FITTING EXACT



Frequent grinding and reseating of Ford valves soon makes the stem too long for a perfect fit. To overcome the uncertainties of the cut-and-try method, a gauge has been developed that shows the exact amount the stem is too long. The gauge is in two parts, a thickness member that fits over the tappet, and a tubular member that is inserted in the valve-stem guide. When the head of the gauge is pressed down to a tight fit on the valve seat, the collapsing tube is shortened to the correct length for that particular valve, and the excess length of the stem is cut off.



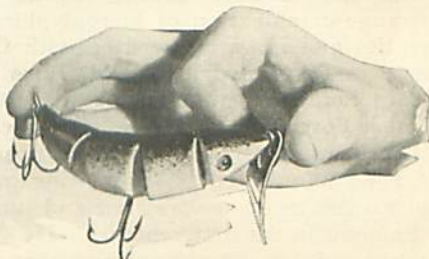
Passengers Can Be Embarked and Disembarked Quickly with This Automatic Dock Gangplank That Fits the Entrances of Any Size Vessel

AUTOMATIC GANGPLANK SPEEDS SHIP LOADING

Adjustable to any ship entrance, a gangplank that speeds up embarking and disembarking of passengers has been introduced in marine travel. The device moves on rails along the pier and can be raised or lowered to the height of gangways.

WIGGLING FISH LURE IMITATES LIVE MINNOW IN WATER

Imitating the motions of a live minnow in the water, a jointed lure has been found a good bait for even the most wary of fish. It is in the form and color of a minnow, but the sectional body contains four joints and the large spoon helps to impart a lifelike motion in casting, causing the sections to weave in the water.



Fish Lure with Sectional Body That Imitates Movements of a Live Minnow in the Water



Power Saw Can Be Operated at Any Angle in Cutting Giant Redwoods, as Shown Above and at Right

PORTABLE POWER SAW SAVES WORK FELLING REDWOODS

Driven by gasoline, a power saw for felling big timber has been found practical in the redwoods section of the Pacific coast. The saw is portable, a factor in working with the immense trees. Saws from five to twelve feet in length may be operated with the engine.

"AD" TWO THOUSAND YEARS OLD EXTOLS DREAM INTERPRETER

In the third century B. C., an enterprising business man in Egypt devised a cleverly worded advertisement and inscribed it on a small stone to call the attention of the public to his ability as an interpreter of dreams. The sign was discovered and deciphered recently by Dr. Nathaniel Julius Reich, of Dropsie college, while he was making a study of writings found at the Temple of Serapis, near Memphis. It consisted of only sixteen words in a strange combination of hieroglyphics, hieratics and Egyptian written with Greek letters. Translated, it read, "Dreams I explain, holding the commands of the Gods. Good Fortune! A Crete will interpret them." An analysis shows the writer had a good knowledge of advertising principles. His message was brief and came to the point in the first sentence. He subtly suggested, but did not promise, that those who came to him with their dreams would

hear good news and assured prospective customers that he knew his business as he was "under command of the Gods." As a last touch he revealed himself as a foreigner in Egypt, from the Island of Crete. The sign had been set up strategically before the Avenue



of Sphinxes leading to the temple where many came to have their dreams interpreted by priests.

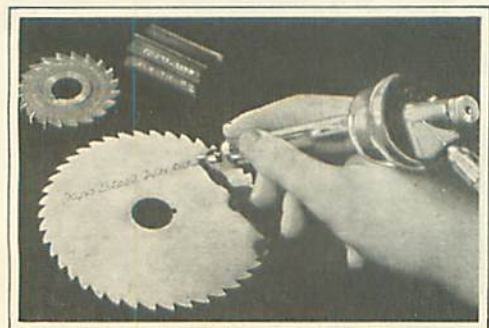
ARTIFICIAL RAIN TESTS PHONES WHEN NATURE FAILS

When nature fails to provide showers, artificial rain is produced by a sprinkler system of testing materials to be used in the nation's telephones. Rain, whether artificial or real, pours down on a carefully selected collection of metals and alloys day after day. Some of the equipment is unfinished, while other parts are covered with metallic coatings or paints. If these materials survive the weather tests, they generally are adopted for use in constructing some part of the telephone equipment. In other parts of the Bell Telephone laboratories, other tests are conducted. Even the felt attached to the bottom of each phone is subjected to se-

vere experiments to determine its wearing qualities. In one corner, a tumbling barrel gives a new type of microphone all the shocks and vibrations which might be expected in airplanes, for which the instrument is designed. A mechanical swan automatically plucks a plug from the switchboard and drops it, hundreds of times a day, to test the cord. By this method, engineers are able to study at first hand and provide means for strengthening the cords.

WRITING ON STEEL WITH HIGH-SPEED GRINDER

Extensive industrial use is being made of a grinder which revolves at speeds of 40,000 to 100,000 times per minute. Such a rate of rotation is made possible by using compressed air at a pressure of from thirty to 100 pounds per square inch to operate a very efficient small turbine. The grinder weighs less than a pound and is shaped somewhat like a lead pencil and used in the same way. It is employed for the accurate shaping of metal parts and castings in locations not easily accessible, and for writing identification marks and numbers on glass, hardened steel and other very hard metals. Characters can be written as fast as the work could be done with an ordinary pencil.



High-Speed Grinder That Can Be Used Like Pencil to Write Identification Marks on Metal



Lightweight Summer Hat Made of Braided Cotton and Resembling a Leghorn Straw; at Left, Some of the Cotton Braid in Various Designs

SUMMER HAT OF COTTON BRAID LOOKS LIKE LEGHORN

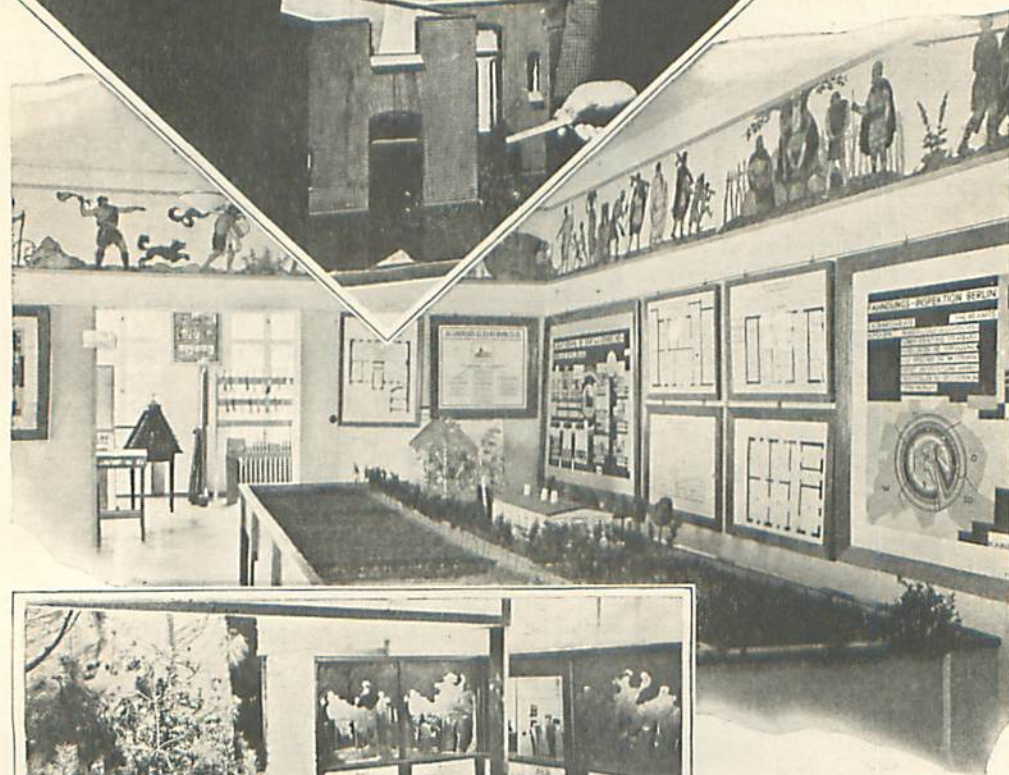
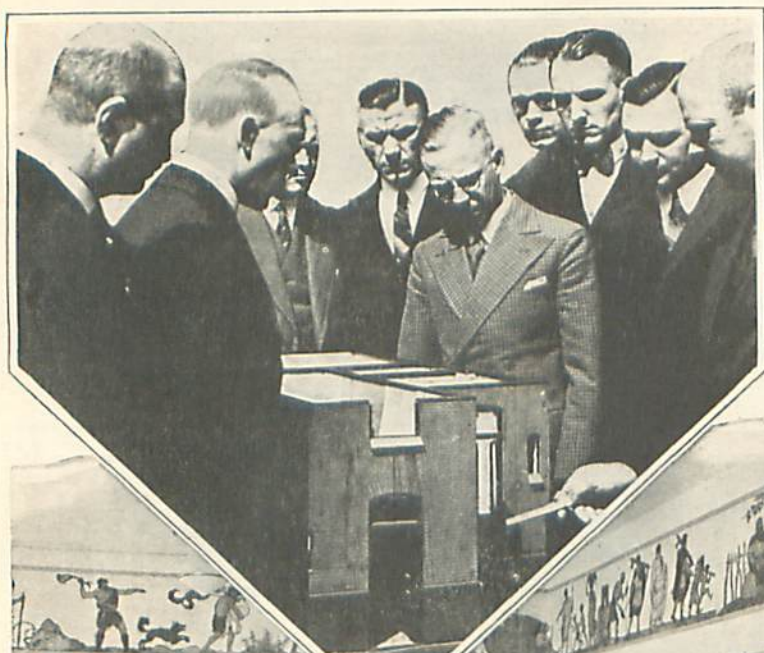
Summer hats for men are now being made from cotton braid, the headpieces resembling those of leghorn straw in appearance. The cotton hats are sewed and blocked like those of straw and are stiffened with a cellulose lacquer. They are said to be cool and comfortable and cost less than the straw varieties they resemble.

CENTRAL RADIO RECEIVING SET SERVES MANY SUBSCRIBERS

Thousands of English subscribers get their radio programs from loud speakers plugged in on a line running from a central receiving set. Selective receivers with high-powered amplifiers are placed in stations at central points in each district. Programs picked up by these sets are sent out over a system of feeder lines which are tapped to serve individual homes. One such receiver serves 1,500 subscribers at a time. The cost is about thirty-five cents a week, in addition to the radio license. Freedom from interference and from the responsibilities of maintenance are inducements to subscribers.

Detectives in Making—A School in Which

Berlin's Future Detectives Take a Course in a School of Criminology Where They Receive Training in Police Regulations, Ways of Detecting Crime and in Lines of Reasoning to Be Followed in Solving Crimes; at Left, a Model Is Being Used to Demonstrate a Theoretical Crime, the Students Being Required to Tell How Criminal Escaped from Facts Available



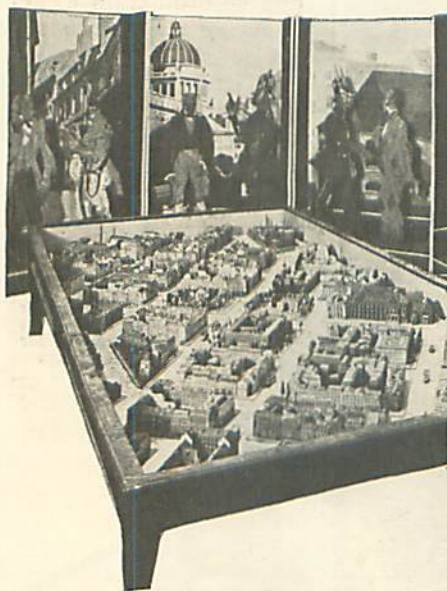
Above, Large-Scale Street Model of Scene of a Crime Augmented by Wall Drawings to Give Greater Detail; Pupils Must Study the Model and by Reasoning and Deduction Decide Which Way a Slayer Must Have Fled; at Left, Reproduction of Scene Where a Body Was Discovered with Cards Showing Where Gun, Cartridges and Blood Were Found; Students Decide Whether It Was Murder or Suicide

Police Rookies of Berlin Learn Their Craft

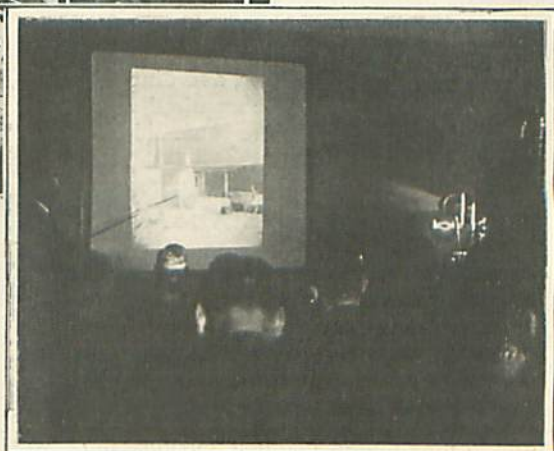
Right, Students of the Berlin School of Criminology Finding Out How Easy It Is to Rob a Person Sleeping in a Public Park



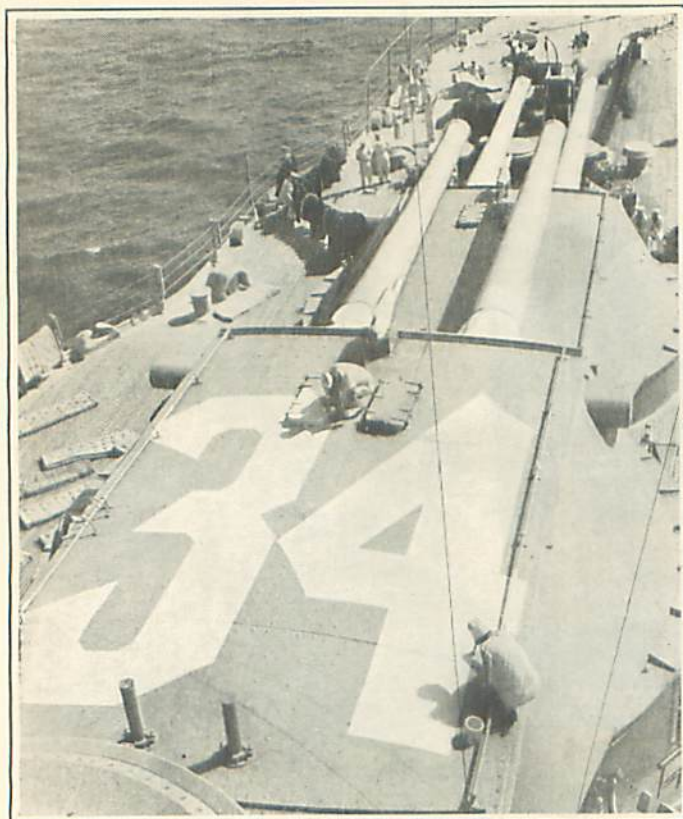
Above, after Watching Pick-pocket Operate, Students Write Down Details



Left, Large-Scale Street Model Where Instructors Explain Best Disposition of Forces for a Police Raid and Point Out the Strategy in Placing Limited Number of Men to Cover All the Territory



Moving Pictures Being Shown in the School of Criminology to Give Students a Thorough Understanding of How a Thief Sets About His Work and the Tools He Uses



Huge Numbers, Like the "34" Shown Above, Helped Airplane Pilots Identify Battleships during the War Games off the Hawaiian Islands

NUMBERS ON U. S. BATTLESHIPS GUIDE FLYERS IN WAR GAME

Battleships engaged in the United States army and navy maneuvers off the Hawaiian islands had numbers painted on top of their gun turrets to guide service aviators. War vessels attacking the islands could be identified easily from the air, avoiding the confusion that might have resulted from an "attack" by pilots on the same side.

SECRET PASSAGE OF ANCIENTS FOUND AT MONTE ALBAN

Monte Alban's ruins, in which an Indian treasure tomb was found, contains a tunnel that apparently was a secret passageway which the ancients traveled to and from the city. Archaeologists have uncovered the tunnel entrance and an Indian has penetrated the shaft 250 feet, finding human bones and a curious pot thought to be an incense burner. Monte

Alban, near Mexico City, will provide work for generations of archaeologists, since only the north terrace has been cleared. In the center of the terrace is a sunken court where they believe secret funeral and other rites took place. Monte Alban is thought to have been a sacred cemetery city and the entrance to the world beyond the grave, rather than an Indian metropolis. North terrace is known as the "Temple of the Tiger."

EXERCISER HELPS IMPROVE WEAK EYES

Weakened eyes can be strengthened, reviving impaired vision, by an exerciser designed like a stereoscope. Hand-and-eye co-ordination exercises are used, with the device aiding the eyes. One exercise consists in filling in an incomplete

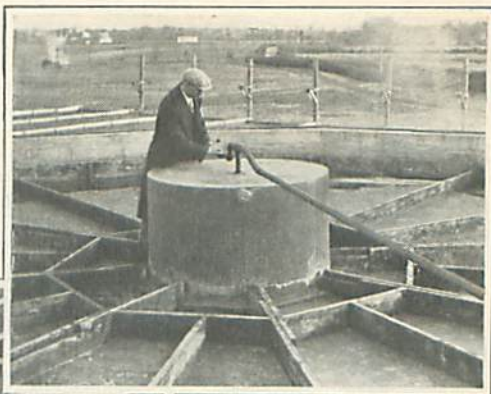
drawing, the original appearing beside the one on which the student works. Twelve years were spent in experimentation before the "manuductor," or eye exerciser, was produced.



To Strengthen Weak Eyes, This Magnifier Is Used As Exerciser for Filling in Drawings

City Obtains Heat and Power from Sewage

At a cost of almost nothing to operate, because the plant supplies its own fuel, a sewage-disposal system in New Jersey runs on the sewer gas from the city's waste. Long known as a dangerous explosive, the gas is tamed to drive electric generators, compressors, refrigerators, steam boilers, gasoline engines, and every other piece of equipment in



© Halbran

Here Is the Equipment Used to Harness Sewer Gas, a Dangerous Explosive; Tamed, It Supplies Heat and Power for Sewage-Disposal Plant

the plant. It also heats and lights all the buildings and is said to have fifty per cent more heating power than other manufactured gas. Exhaust pipes are water-jacketed and the hot water piped into the radiators.

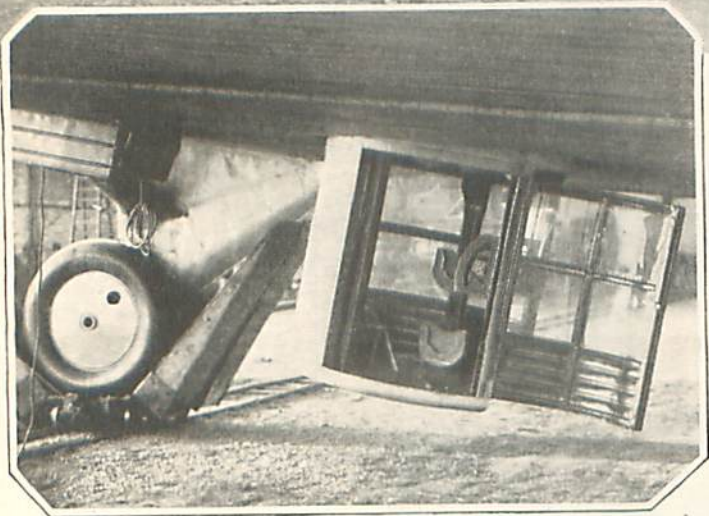
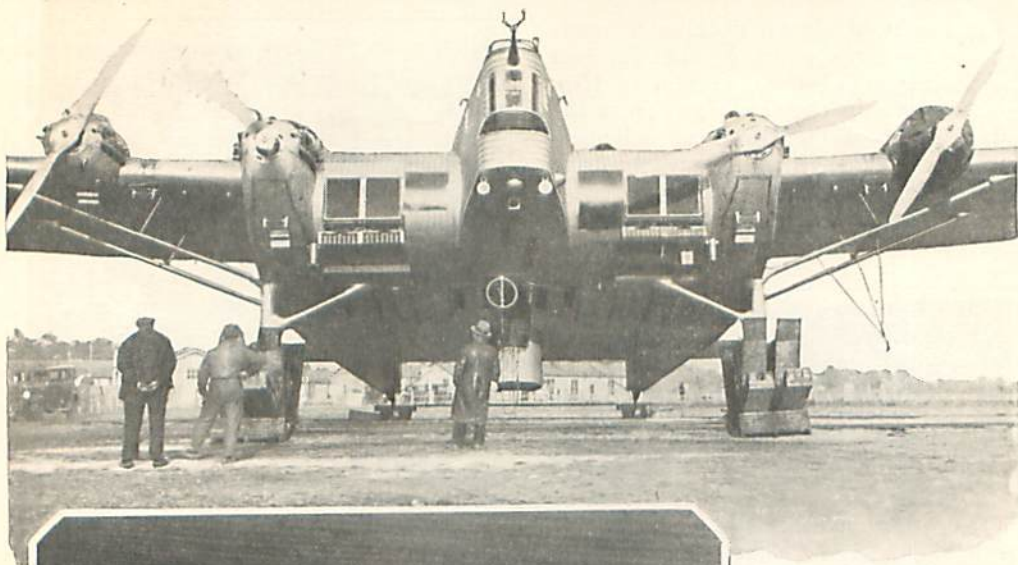
SAFETY SLOTS IN BIRD'S WING AID AIRPLANE DESIGNING

Safety devices and the general shape of birds' wings are being studied closely by airplane designers in an attempt to pro-

duce aircraft that can be maneuvered as easily as the bird flies. Practically all the large and medium-sized birds have multiple wing tip slots, that is, their feathers separate at certain phases of flight, making soaring and landing easier. These slots operate automatically, one student discovered by holding a bird's wing in front of an electric fan. In addition, microscopic study of wings has revealed small hooks on the under feathers that prevent the slots from opening too far. The hooks are flexible and easily unlock to let the feathers slip back into place when the slot is not needed. Some designers already

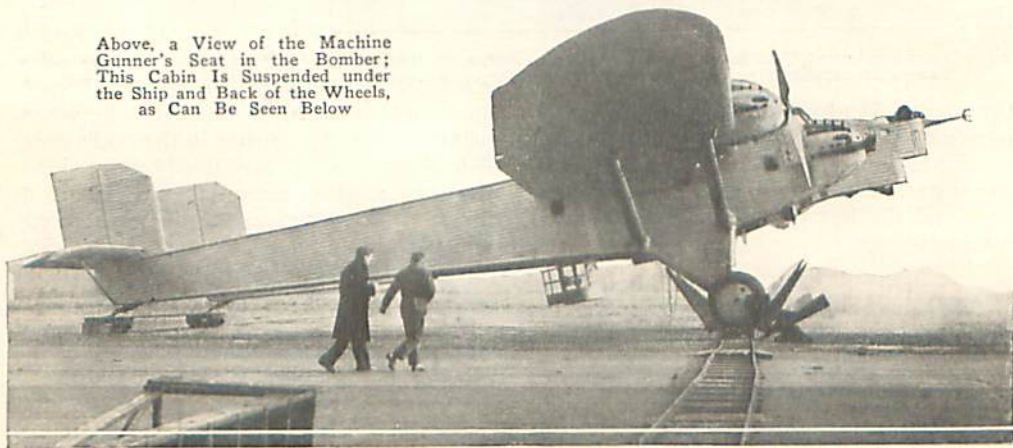
have employed the slot in airplane wings, using one similar to that in the teal's wing. A braking effect is produced by the slot in that bird's wing, permitting it to land on water without capsizing. The large birds, which glide and soar, do not require slots in their wings, but birds with small span and with square or rounded tips on their wings have slots for control and lift. Designers of gliders follow the general shape of the soaring bird's wings, while airplane makers are studying the control devices of small birds.

Giant Flyer Carries Three Tons of Bombs



Above, a Head-On View of a Huge Night-Bombing Plane Recently Tested at Bordeaux; It Can Take Off with 5,500 Pounds of Bombs and Is Equipped with Three Machine Guns for Defensive Fighting; the Ship Has a Top Speed of About 170 Miles an Hour, Can Attain an Altitude of 11,500 Feet, and Develops Over 2,000 Horsepower; It Is Seventy Feet Long and About 120 Feet Wide; Note Position of Pilot's Cabin in the Nose

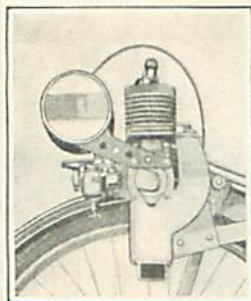
Above, a View of the Machine Gunner's Seat in the Bomber; This Cabin Is Suspended under the Ship and Back of the Wheels, as Can Be Seen Below



COLD WEATHER PLAYS TRICKS WITH FLYERS' PHONES

Transport pilots who communicate regularly with ground stations by means of radio telephone reported much trouble during the past winter from an atmospheric peculiarity known as "skip distance." The voice of a pilot flying between New York and Chicago, for instance, was heard clearly at Fort Worth when the ground-station operator at Chicago could not hear him. Likewise another flyer over Redding, Calif., was heard at Des Moines, but a dispatcher at Oakland, 300 miles away, could not pick him up, and a pilot over Kansas City was heard more distinctly at Spokane than at Moline, Ill. To counteract such conditions, the pilots are covered not only by their nearest home station, but also by distant dispatchers who can serve as relay stations to report between the pilot and his ground station when his voice is lost to the station to which he is trying to talk. The pilots must report to ground stations and receive weather information from them at intervals not exceeding twenty minutes, so that failure to hear a pilot is cause for immediate concern.

MOTOR BICYCLE FREE-WHEELS BY RAISING ENGINE



Free wheeling for motor bicycles is provided by a one-cylinder engine which may be raised clear of the drive engagement by a lever operated by the rider. The motor is started by pedaling the bicycle until fair

speed is attained and then lowering the motor into contact with the rear tire. Speeds up to thirty miles an hour are available. When the rider starts down a hill, he may get the free-wheeling effect by pushing the engagement lever down, lifting the engine from the rear tire. A throttle, which is pushed forward for more speed and back to reduce speed, makes operation easy.



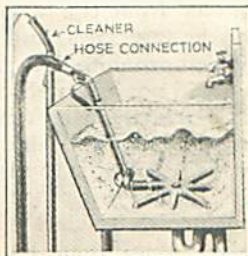
Photos Made with Small Cameras Are Easier to View if This Magnifier Is Used

MAGNIFIER FOR SMALL PHOTOS USED IN METAL VIEWER

Equipped with a magnifying lens for viewing photographs too small for observation by the eye, a metal viewer has been placed on the American market. The device, made in Germany, is designed especially for pictures taken by small cameras using film one by one and one-half inches. Details of such photos are brought out clearly by the magnifying lens. A photograph is placed in a slot at one end, and the lens is moved back and forth for focusing, while the observer is holding the lens close to one eye.

VACUUM CLEANER TURNS TUBS INTO WASHING MACHINES

Any laundry tub is quickly converted into a washing machine with the aid of a new attachment for the vacuum cleaner. It consists of a metal tube which can be hooked to the side of the tub and connected with the vacuum-cleaner hose. On the lower end is a star-like attachment that lies flat on the bottom of the tub. Air holes in the star points allow the air to rise under pressure, forcing suds through the clothes.





Restoration of This Beast's Head, Resembling That of an Ancient Rhino, Is Shown; Note the Massive Horns Arming the Nose

ANCIENT RHINO'S HORNED HEAD UNEARTHED IN BAD LANDS

Armed with a massive pair of horns rising two feet above the nose, the giant skeleton of a rhino-like creature that roamed the Bad Lands of Montana centuries ago, has been restored to a lifelike appearance. The head was unearthed last summer. The formidable horns were used for battering, charging and tossing the great animal's enemies. The body was twice as big as the largest Indian rhinoceros of today.

LUMBER SEASONED IN ONE DAY BY RESPIRATION PROCESS

Thorough seasoning of lumber can be attained in from twelve to twenty hours by a method developed by a Swedish forestry expert and known as the respiration process. It consists in alternately exposing the lumber to hot, dry air under normal atmospheric pressure and then to a high vacuum. Raw logs, direct from the raft, yield to the treatment, which extracts from the wood certain humidity-attracting salts and organic substances which promote decay. Lumber thus treated will not again absorb moisture, nor will it crack, warp or develop blue rot. The method is applicable also to rare woods which are liable to rapid decay in the tropics. Using this process, lumbermen expect to furnish builders with parts cut to exact size, saving them much waste.

AIR TUNNEL IN CAR WILL REDUCE RESISTANCE

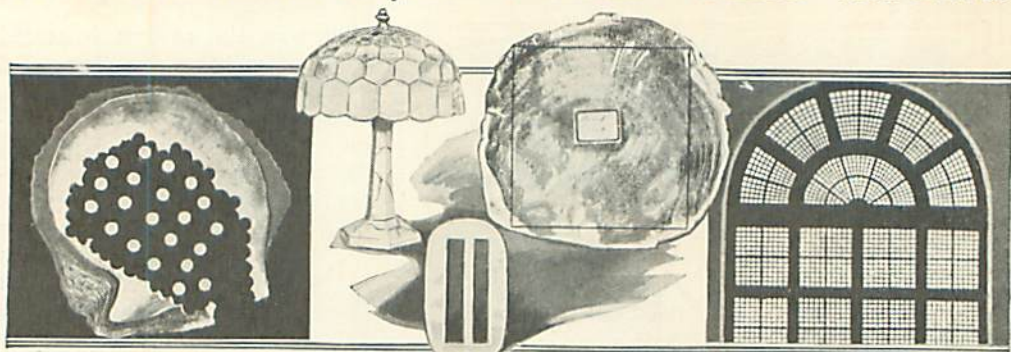
Most of the streamlining of the modern automobile to reduce wind resistance has been applied to the front end, although it is well known that a low-pressure area or partial vacuum at the rear retards progress about as much as the high-pressure area in front. Streamlining the rear end ordinarily entails added length, but this objection has been overcome in a recent invention known as a vacuum breaker.

This is merely an air passage in the back of the body. There is an opening in the back, covered by a grill, and from it an air passage extends through the body to a point in front of the gasoline tank. From this point under the car where pressure is created, air is scooped up and forced out at the rear where a low-pressure area exists. This tends to equalize pressures at front and rear.



Outlet for an Air Passage in Rear of Auto Body Which Helps Reduce Wind Resistance

Window-Shell Oyster Makes "Glass" for Arts



Shell after Cutting to Obtain Buttons, Left; Lamp and Buckle Made from "Window-Shell" Oyster; How the Transparent Shell Is Cut, and at Right, Ornamental Window Made from Shells

Art windows, lamps, buckles, buttons, and many other useful and ornamental objects, are produced from the extremely thin and translucent shell of an oyster, native to the South Pacific. The shells often reach a short diameter of from twelve to fourteen centimeters. (Four and two-thirds to five and one-half inches.) They have a laminated structure and one valve is flat while the other is slightly concave. The flat halves are cut in squares and other geometric figures for use most often in windows, while the concave surfaces find ready markets in the arts. The Chinese for many years have used the shells instead of glass for windows and, in some of the oldest churches in Manila, the shell panes have withstood the rigors of a tropical climate for hundreds of years. Art and science find the shells adaptable for paneling, concealed lighting systems, partitions, shades, lanterns, shields, trays, screens, place cards, picture frames, candlesticks and cake and fruit dishes. The mollusks producing the shells are highly prolific and are often found in waters so shallow the gatherers can wade for them.

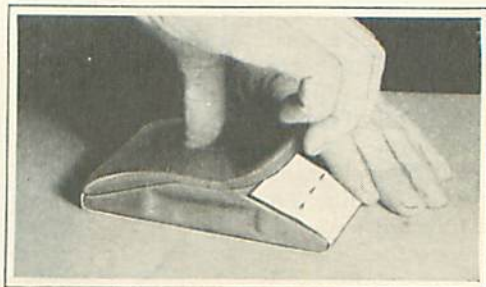
THE WORLD OF HIGH PRESSURE IS MODERN "WONDERLAND"

A modern "Wonderland" has been created in the laboratories of a Harvard professor who is exploring the world of high pressure. Matter is sometimes subjected to as much as 40,000 times the pressure it ever bears in ordinary existence. Gases become as dense as liquids, the molecules that compose them, and in turn the atoms

that compose the molecules, being driven together in a densely packed mass. Many soft and pliable substances lose all their characteristics under intense pressure. Paraffin wax becomes harder than steel, and, in fact, it has been found not at all difficult to make a piece of steel flow by pushing it with a stick of paraffin. Soft rubber becomes so hard that it may be utilized as a die to cut steel. Six different kinds of ice which can exist only under high pressures have been found.

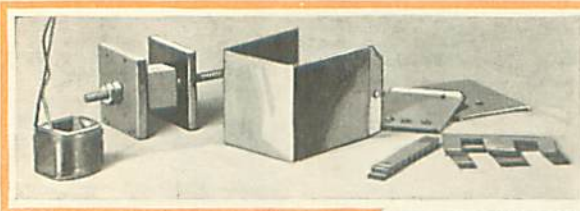
RUBBER BLOCK FOR SANDPAPER GIVES COMFORTABLE GRIP

Strips of sandpaper are held securely in a rubber block that gives a comfortable grip when using this abrasive. Each standard sheet of paper provides four strips for the block. These are held in place by imbedded pins in the top of the block whose points are covered by flaps. The block can be used equally well for either dry or wet sanding.



An Easy Way of Using Sandpaper Is to Attach It to a Rubber Block, Giving a Comfortable Grip

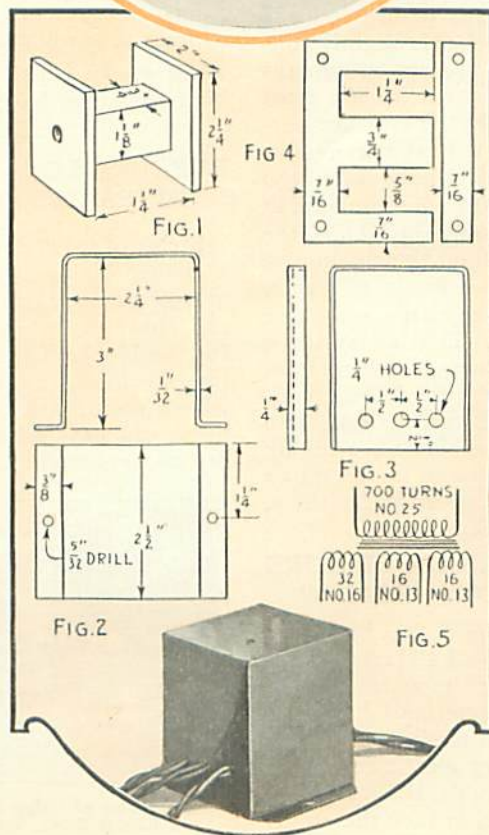
Filament Transformer Serves All Purposes



Supplying a variety of filament voltages, this transformer may be built for either 25 or 60-cycle 110-volt line supply. The temporary form for winding the coil for 60 cycles is shown in Fig. 1. The size of the winding block is increased to $\frac{3}{4}$ by $2\frac{1}{2}$ in. for a 25-cycle supply. In this case, the same number of turns and wire sizes indicated in Fig. 5 are used, but double the quantity of wire specified will be required, and the number of E and I-laminations will be 180 of each kind. For the 60-cycle type shown, 80 E and I 29-gauge laminations of transformer steel are required, and these may be purchased ready cut and drilled. The metal container, Figs. 2 and 3, will, of course, have to be enlarged if the 25-cycle transformer is built. The flat metal piece to be bent as shown above in Fig. 2 is $2\frac{1}{2}$ by 7 in. After the transformer is

placed in the case it is sealed with melted beeswax. Enameled magnet wire is used for all coils. The 700-turn primary coil requires about $\frac{1}{3}$ lb. of wire and the two 2.5-volt 5-amp. secondary coils about the same amount.

These two windings will supply six tubes in two groups of three tubes each. A third secondary winding of 32 turns supplies 5 volts, or 48 turns will furnish 7.5 volts for power tubes. A turn or two of heavy wrapping paper is wound around the coil form without glue and then continued with glue between the layers until the paper is about $\frac{1}{16}$ in. thick. The primary is wound on first. The two 2.5-volt windings are then wound over the primary in succession and the third winding last. All windings are to be separated with a layer of paper. A $\frac{1}{4}$ -in. machine screw holds the coil form together and is inserted in a chuck for winding. The completed coil is removed from the form and the E core laminations, shown in Fig. 4, are inserted first; an I-lamination is inserted between the E-laminations at the open end, and the core is then clamped together with screws through the corners.

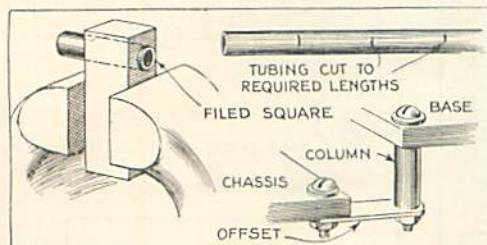


Resistors for C-Bias

Biasing resistors are usually connected from the cathode "K" or the filament center tap of a tube to the chassis of the receiver or to the negative of the plate-current supply, when the bias is obtained by the drop due to the plate current of the tube. The resistance value should be equal to one thousand times the rated negative grid bias of the tube in volts, divided by the rated plate current in milliamperes. The last figure is supplied with each tube by the manufacturer. If more than one tube derives its bias from the same resistor, the necessary resistor value for one tube is found in the same manner, and this resistance value is divided by the number of tubes biased by the resistor.

Spacing Columns from Metal Tubing

When rebuilding variable condensers for short-wave receivers, constructing chassis mountings or raising bakelite insulating panels above the chassis, metal spacing columns are necessary. Tubing sawed into the desired lengths may be prepared as shown and the ends filed

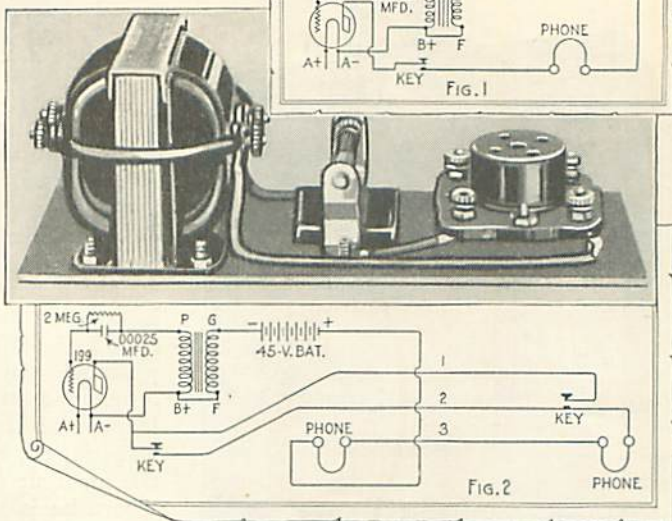


Method of Preparing the Tubing, and Completed Column for Mounting Insulated Base

square by means of a simple jig, made from a metal block clamped in a vise.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists are always available without charge.

The Pleasing Note from
This Practice Set Is Easy
to Copy



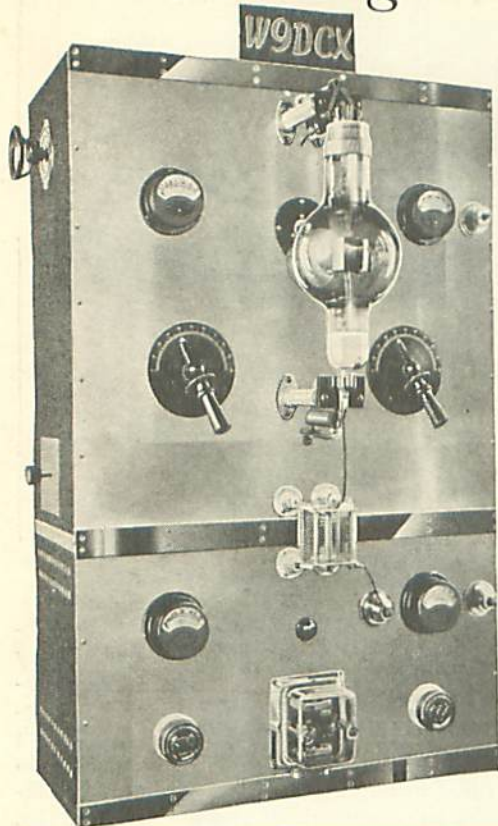
Code Practice Set for Headphones

Made from odds and ends, this a.f. oscillator for code practice may be used by either one or two persons without disturbing other members of the family. The signal received in the phones is identical with that of a radio transmitter. An audio transformer, a 199-tube socket, a .00025-mfd. fixed condenser and a few gridleaks, ranging from $\frac{1}{2}$ to 5 meg., are required. The photo shows the simple arrangement of the parts. The pitch, or tone, received in the phones may be varied at will by changing the value of the gridleak. Fig. 1 shows the wiring for a single pair of phones and one key, and Fig. 2, the three-wire system with keys in parallel and the two sets of headphones in series. Two dry cells in series are used for the filament of the tube, and one 45-volt B-battery will operate the oscillator for several months. —Jack A. Bristol, Omaha, Neb.

Protecting Sensitive Meters

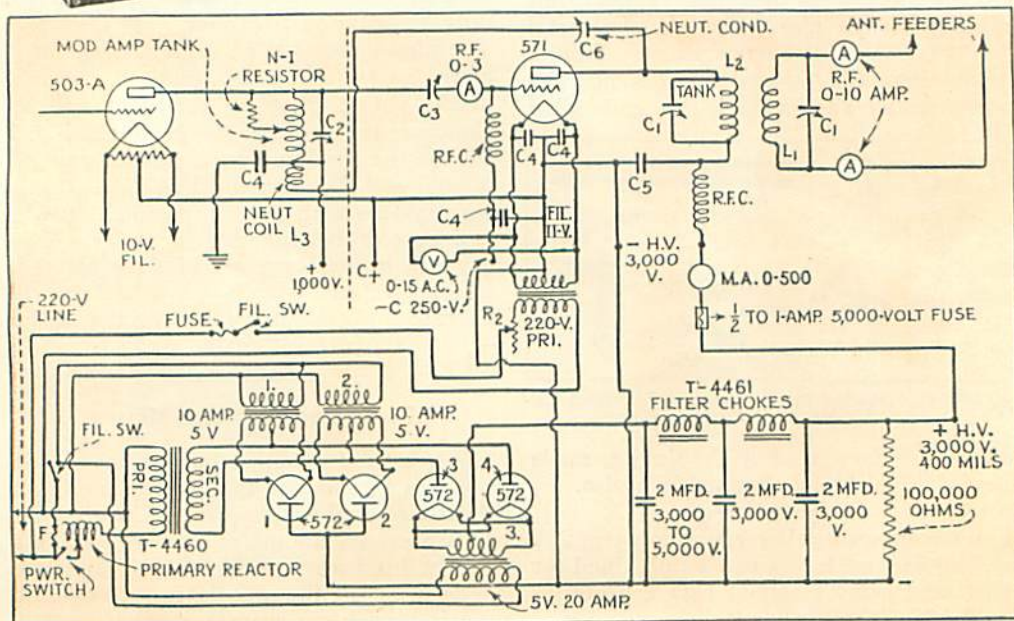
When very sensitive meters are not in use, it is a good idea to keep the terminals short-circuited with a piece of heavy wire. This prevents the meter from collecting a charge from any outside source, and also helps to hold the needle from swinging too freely when the instrument is carried.

Adding HIGH-POWER To 50-Watt



INCREASING the output of any medium-power key or phone transmitter is not difficult for the amateur who has had sufficient experience with lower-powered installations. The necessary apparatus may be elaborate or comparatively simple, depending on the location of the installation and the funds available. The rack and panel layout makes a neat appearance and should be followed if the other apparatus is built accordingly. Open layouts of the breadboard type are advised for experimental purposes, but when the amateur has progressed to the point where he is ready for high power, with the necessary circuit details available and the arrangement decided upon, such installations are not practical.

The output stage of the CW and phone transmitter, described in recent issues of this magazine, may be used to feed a more powerful amplifier instead of being coupled to the antenna circuit. As this was primarily a phone transmitter, the high-power unit to be described is used as a



LINEAR AMPLIFIER Amateur Phone

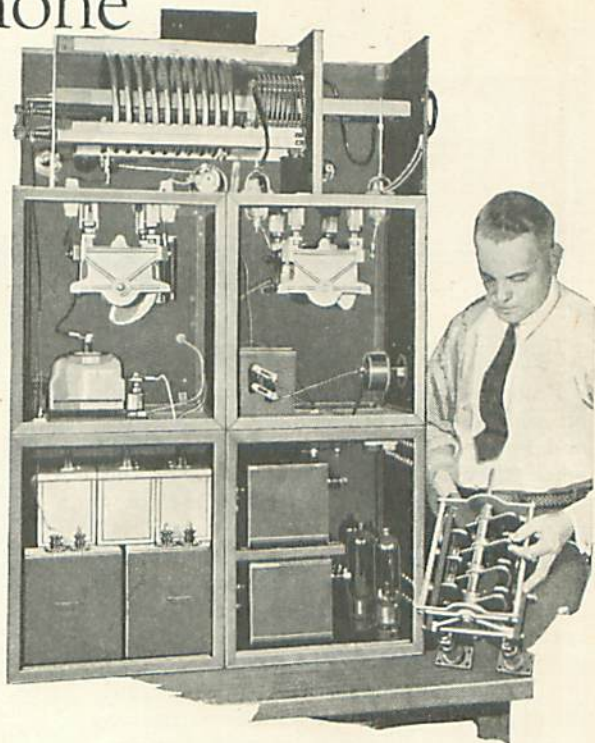
By FRANK L. BRITTIN

linear amplifier. This model installation employs a 500-watt tube and was designed on a rather elaborate scale, to show the possibilities of amateur construction. The circuit details will be practically the same but on simpler lines.

A 250-watt tube may be used, instead of the 500-watt type shown, and such tubes are now employed by many amateurs. A bridge rectifier of slightly less power would be sufficient in this case, and type-66 rectifier tubes could be substituted for the 72's. In either case, a primary reactor should be used to reduce the plate voltage while testing or making adjustments. Fuses in all power leads and a bleeder resistor across the output of the plate power supply, as shown in the diagram, should not be omitted in any case.

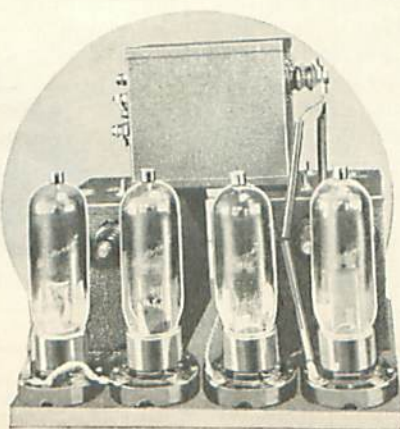
The filament and plate-supply transformers have their primaries wound in two sections which can be connected in series or parallel for use on either a 110 or 220-volt, 60-cycle supply line. The rectifier unit, with its filament-supply transformers Nos. 1, 2 and 3, is shown in the lower photo on this page. The rear-view photo above, taken during construction, shows this rectifier unit with the tubes at the right. In the final assembly, the unit was mounted with the tubes facing the rear, as shown below. The filament transformer for the large transmitting tube is shown in the compartment above.

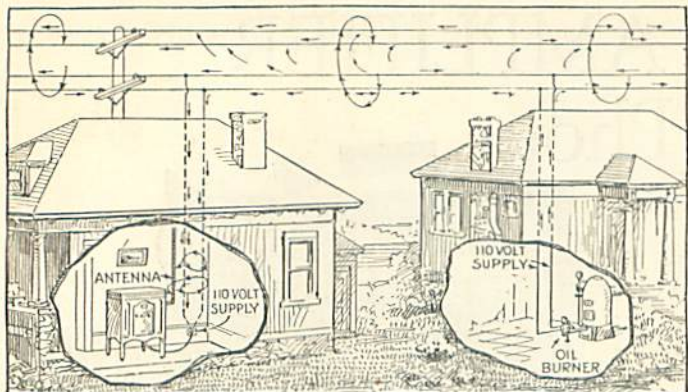
The frame is built up



of brass-angle stock and aluminum panels, the two shielded upper compartments being closed at the rear. The front panel extends above this frame and is made of satin-finished eyrado.

The meters on the front panel, shown in the photo on the opposite page, employ bakelite cases and are mounted $\frac{1}{2}$ in. distant from the metal panel by means of bakelite blocks. A list of the materials and further construction details are available upon application. The log of this completed amateur phone station shows very satisfactory reports from amateur stations located in 42 states and has been heard in Germany.





Radio Interference Inductively Transferred from the Power Line to the Antenna of a Receiver

Interference Carried by Power Lines

Radio listeners troubled by whirring and buzzing noises that come and go at more or less regular intervals, are often puzzled when they fail to find the cause of the trouble on their own property. One common cause of such interference is illustrated in the sketch. Power-line disturbances may be set up, especially when the blower motor of an oil burner in a neighboring building goes into operation. If the motor is defective, or not properly filtered, this disturbance will continue until the apparatus shuts off. This interruption to the flow of line current or discharges of accumulated energy on the conductors, sets up high-frequency voltage, similar to that of radio signals, and these are carried along the line for a considerable distance. The disturbance may enter your receiver through its connection to the power line or may be radiated from the power line and enter the set through the antenna or ground connection. The practice of connecting the ground lead of a.c. receivers to the antenna post, doing away with the antenna, increases the pick-up of such disturbances. A homemade line filter such as the one described in the May, 1930, issue will keep interference of this nature out of the receiver.

Refinishing Meter Cases

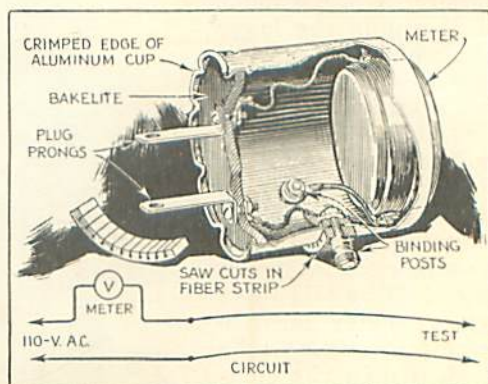
Old meter cases that have become checked and scratched about the workbench may be given a black finish with a quick-drying lacquer. The old finish should

be removed with fine sandpaper and a circular piece of paper placed over the glass before the lacquer is applied.

Homemade Condenser-Tester Plugs in Line

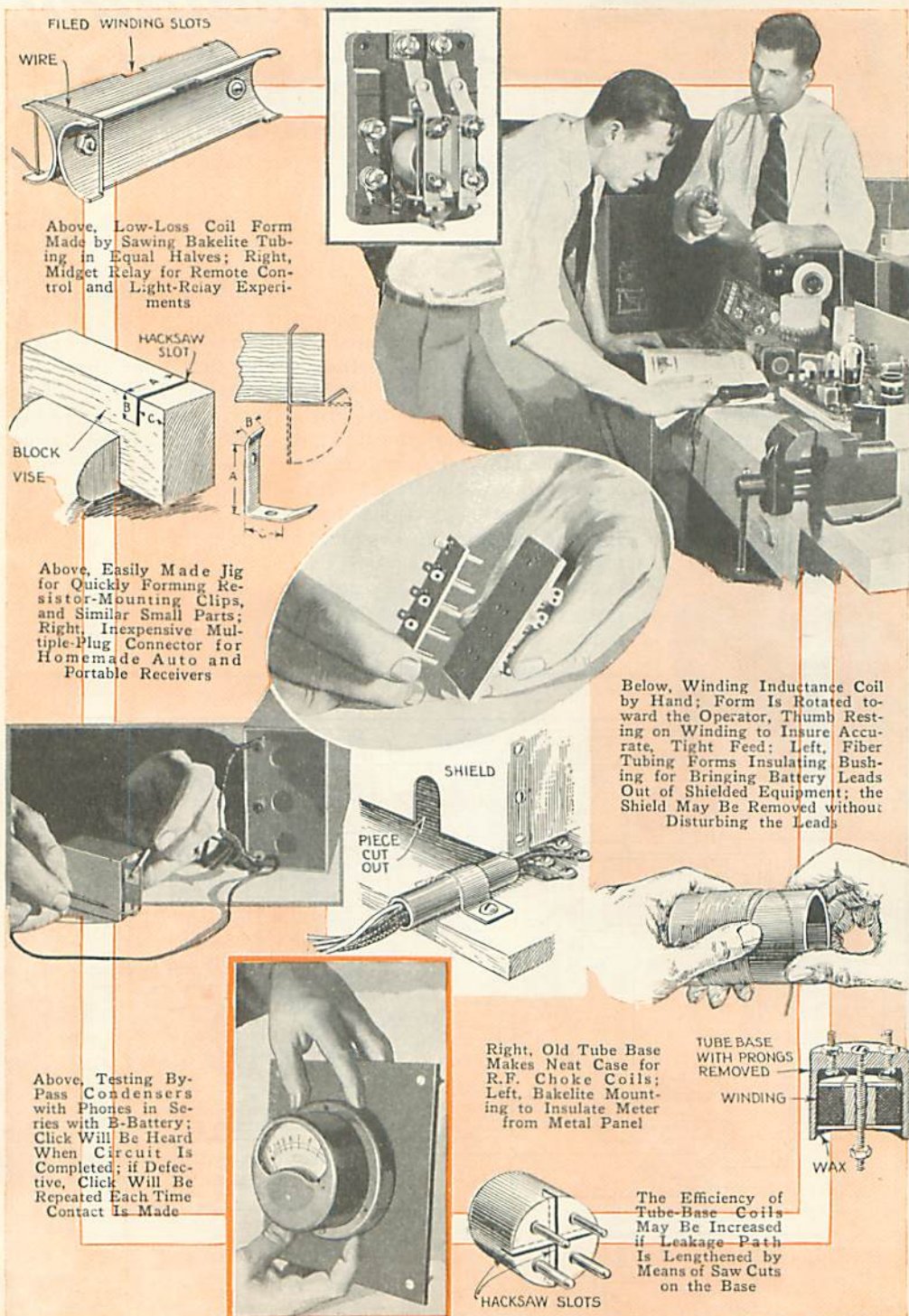
Built to plug directly into the 110-volt a.c. line, this tester will indicate the approximate capacity of filter condensers. Experimenters will find it very useful when salvaging condenser units from

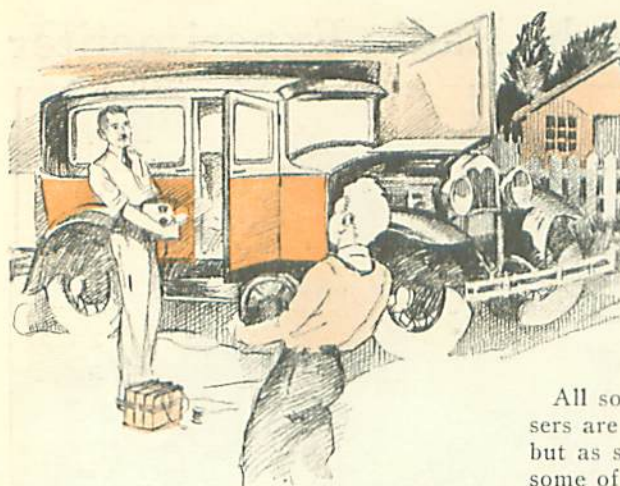
discarded filter blocks. The meter used is an inexpensive 0 to 50-volt B-battery type, which is mounted in the bottom of a small aluminum drinking cup. Two insulated binding posts are mounted on fiber strips through a slot cut in the side of the cup. An appliance plug is dismantled and the prongs mounted on a bakelite disk cut to fit the top of the cup. After the connections are made, the disk is inserted in the open end of the cup and the edges are crimped as shown, a few dents with a center punch holding the disk in position. Using a convenient outlet, no long connecting cords are required. A reading of 10 volts on the meter will indicate a capacity of about 1 mfd. when a condenser of this capacity is connected across the test circuit. Twenty volts for 2 mfd., 30 volts for 3 mfd. and 40 volts for 4 mfd., will follow close enough for all practical purposes.—Charles B. Holm, Lyons, Ill.



Construction Details and Circuit Connections for a Handy Condenser Tester

Practical Ideas for the Radio Experimenter





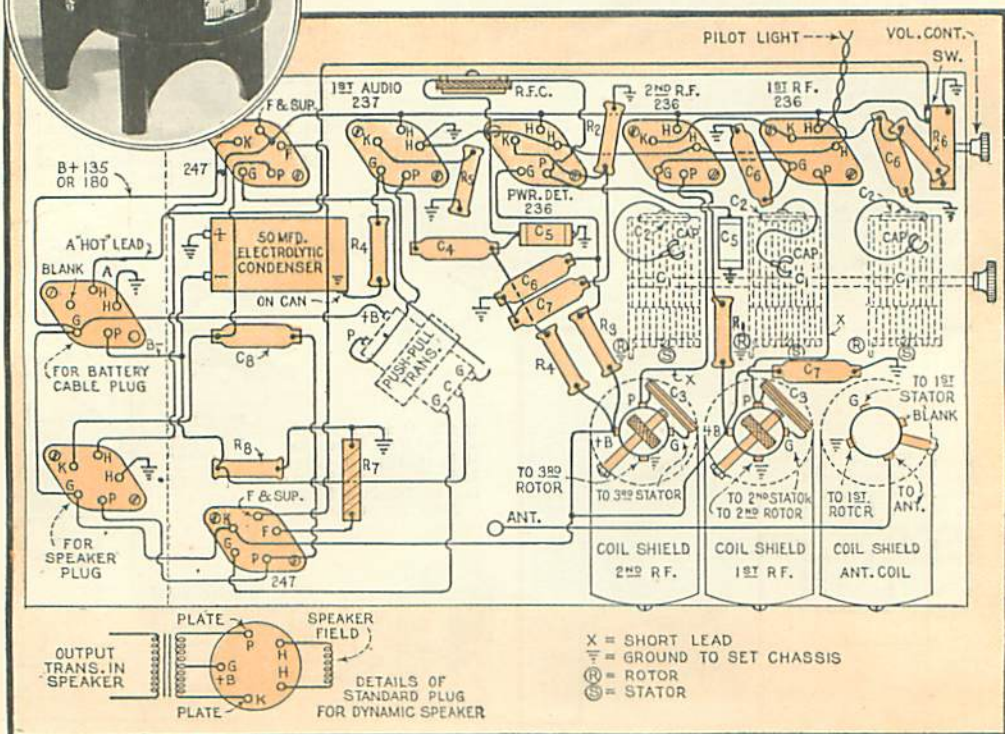
Installing

with the coil terminals labeled, are shown within the dotted circles.

THE simplified wiring diagram on this page represents an underside view of the DX auto receiver described in the May issue. The coil shields are mounted horizontally with the open ends toward the center of the chassis. These open ends,

All sockets, resistors and fixed condensers are shown in their relative positions, but as space is limited under the chassis, some of these are mounted one above the other. The wafer-type sockets should be mounted just as they appear. The section of the diagram at the left of the dotted line indicates the rear end of the chassis, flattened out to show the sockets and connections for the standard battery and speaker plugs which are shown in the insert photo.

The cables leading from the speaker and batteries should be shielded. Their length will depend on the location of the



Your DX AUTO RECEIVER

By FRANK LUND

PART II

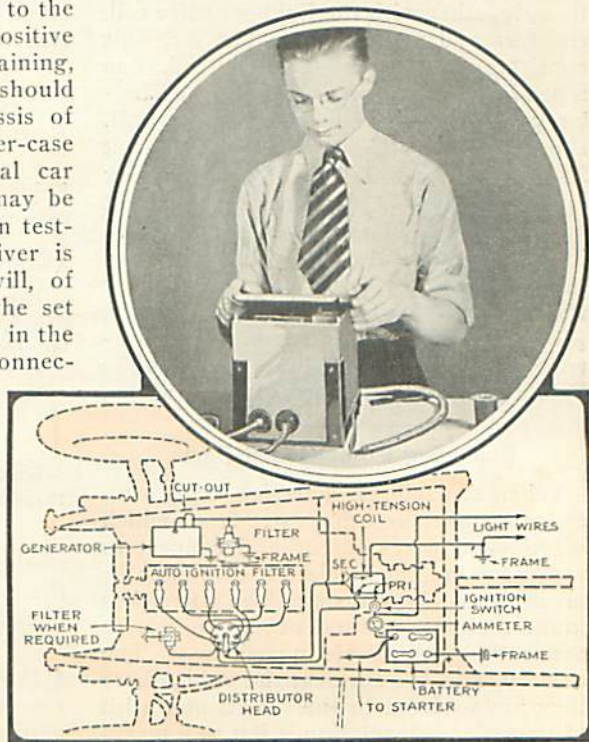


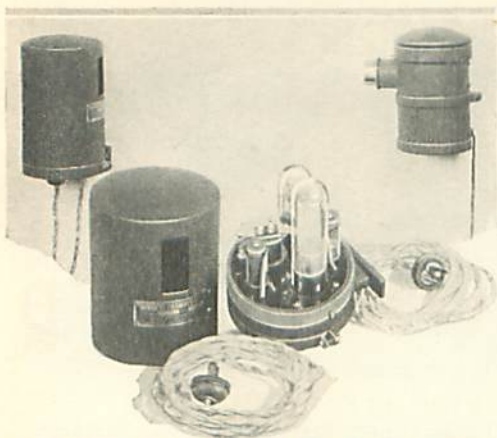
set in the car. The connections for the dynamic-speaker plug are clearly shown in the sketch at lower left. The plug and socket terminals are easily traced by holding the prongs toward you in the manner shown. The G-prong is slightly isolated from the others. The cable leads are color-coded and should be carefully traced from the corresponding terminals at both ends.

It will be noted that one of the battery terminals on the socket is indicated as A "hot"; this is for the connection to the terminal post on the 6-volt storage battery of the car that is not grounded to the frame, irrespective of its being positive or negative. The lead from the remaining, or grounded, post on the battery should be connected directly to the chassis of the receiver. If the metal receiver-case brackets are screwed to the metal car frame, this lead from the socket may be connected to it at any point. When testing the circuit or when the receiver is used outside the car, this lead will, of course, be connected directly to the set chassis. The remaining battery lead in the cable is for the positive B-battery connection at the G-terminal on the battery socket and plug. The filament switch is combined with the volume control. The negative terminal of the B-battery is directly connected to the grounded side of the installation at any point. When using the receiver outside of the car or when testing, use the negative side of a 6-volt storage battery as the grounded side and run an additional lead from this battery post to any convenient ground. Additional details

for boat installations are given in the material list that is available upon application.

The photo over the diagram below shows a remote-control device that may be mounted on the steering column for use instead of the controls on the receiver. Enlarged circuit and layout diagrams are available for those who wish them. Interference filter kits for car ignition systems are simple to install as shown in the diagram. Practically any type of car antenna may be used although the one suggested in Part I gave excellent results.





Light-Relay Unit with Cover Removed to Show Cell and Amplifier Tube; Above, Relay and Light Source in Operating Position

Light Relay Complete in Package Form

Ready-to-use light relays and light-source units, of rugged construction, are now available for the control of electrically operated apparatus of all descriptions. These light relays are made for either a.c. or d.c. operation on the usual power supplies. The a.c. unit employs two type-27 tubes, serving as amplifier and rectifier, together with the light-sensitive cell, resistors and power relay. The d.c. unit consists of the light-sensitive cell, one type-27 tube as an amplifier, and a similar power relay. The light-source unit, shown at upper right, employs a 12-volt 21-candlepower bulb as well as a focusing optical system to concentrate the light beam on the light-sensitive surface of the light-relay unit. As a burglar alarm, an invisible beam of light, made possible by the use of a color filter in the light source, protects a doorway or room. Any interruption of the invisible beam actuates the light relay, which in turn gives an alarm.

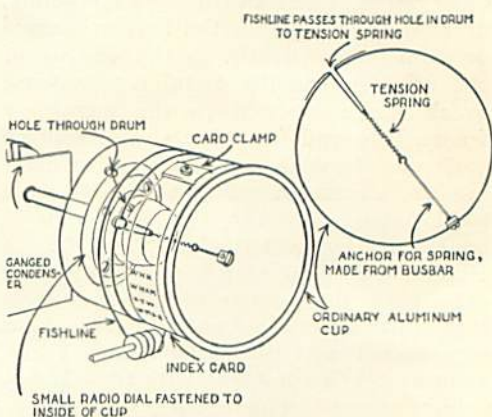
Replacing Color-Coded Parts

When replacing a defective transformer, condenser, or other part from which color-coded wires extend and connect to various points in the circuit, care must be taken to avoid confusion. The writer has found a simple method of making wrong connections impossible in such cases. The colored leads are cut near the point where they are soldered in the circuit and a bit of the colored insulation is left as a mark-

er. The old piece of wire is removed when the new lead of the same color is soldered in place. When the defective unit does not employ color-coded leads, a sketch of the unit and its connections should be made before the old part is removed or any leads cut. Small price tags may be used to identify each connection in the circuit and the sketch should be marked accordingly.—A. E. Teachman, Woonsocket, R. I.

Drum Dial from Cup

A ten-cent aluminum drinking cup supplies the necessary drum for constructing this inexpensive homemade dial. It may be used to advantage in revamping old sets or in experimental hookups. All details are given in the sketch. The small winding drum below, for the shaft which extends through the front panel to the control knob, is mounted on the subpanel with angle brackets. The tension spring should be heavy enough to take the slack out of the cord without putting undue strain on the parts. The clamp, for holding the index card, is a strip of thin metal with the edges turned down to grip the card. The hole through the drum at the rear is to provide access to the setscrew



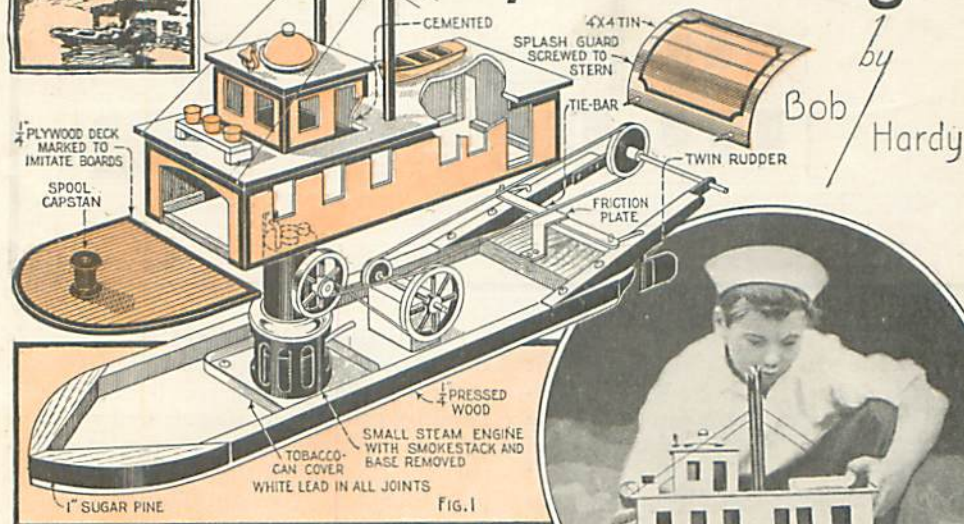
Homemade Drum Dial, Showing Construction Details and Method of Mounting

of the flat dial that holds the assembly to the condenser shaft.—Ross J. Plaisted, Brecksville, Ohio.

For further information on any radio construction article write to the radio department; this service is free.



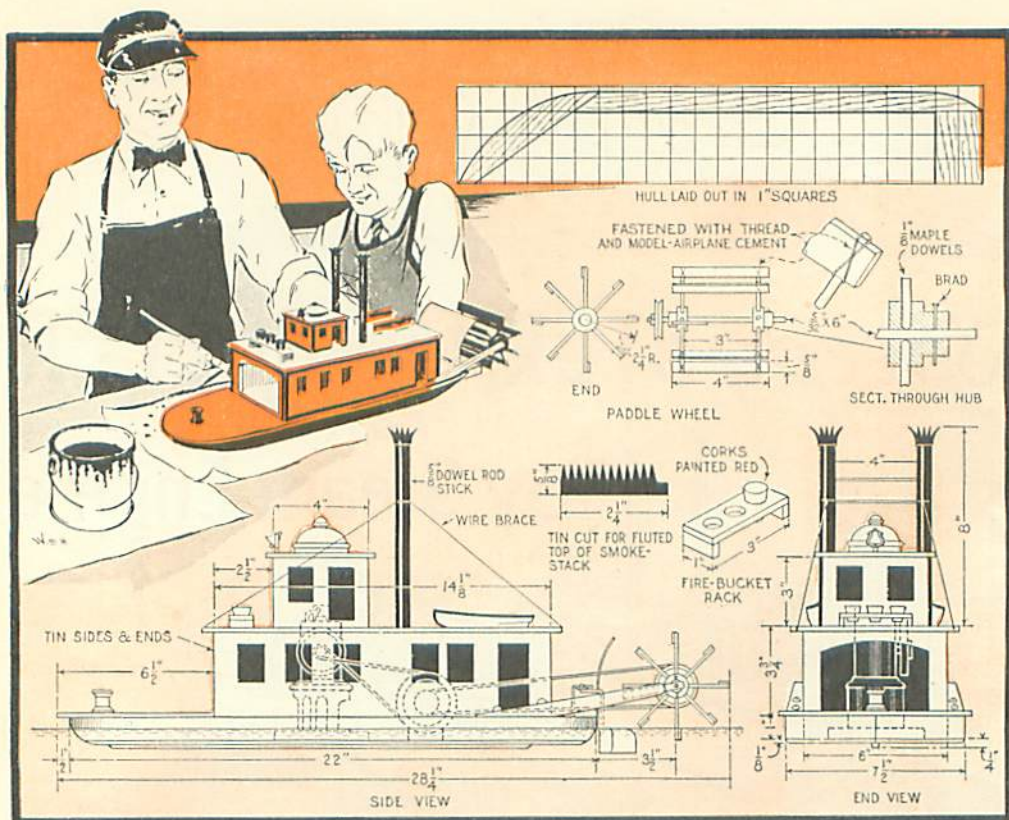
Speedy STERN-WHEELER *run by* Toy Steam Engine



THIS stern-wheeler, which is run by a toy steam engine, proved to be one of the fastest model boats every built by the writer. The secret of the speed lies in its light weight and shallow draft, the entire boat weighing about 4 lb. with the boiler filled and everything ready to go.

The planking and deck may be made from either pressed wood or light veneer, while the cabin sides and ends are light tin or cardboard. If still lighter weight is desired, the frame may be made of balsa wood instead of sugar pine. After cutting out the parts, give them an application of paint or shellac before and after assembling. The original base of the steam engine is removed and a tin-can lid substi-

tuted, which is screwed to the bottom. The idea of this alteration is to bring the engine lower in the boat than would be possible with the original base attached, and also to provide protection in case alcohol spills out of the burner. The countershaft, obtained from a standard toy construction set, is held on a balsa block. It runs in two small angle brackets, also taken from the construction set, and is provided with a small and large pulley having a 3 to 1 ratio. A 2-in. pulley is



provided on the paddle-wheel shaft. You may vary the size of the pulleys to suit the power obtained from your steam engine in order to get the greatest possible speed. Beams, carrying the paddle wheel and rudders, are screwed to the frame of the boat as indicated, while heavy brass wire is used for rudder posts to which the rudders are soldered. Two rudders are used instead of one, which is preferable on a stern-wheel type of boat, both being linked together with a tie-bar, which is held in any desired position by means of a friction plate.

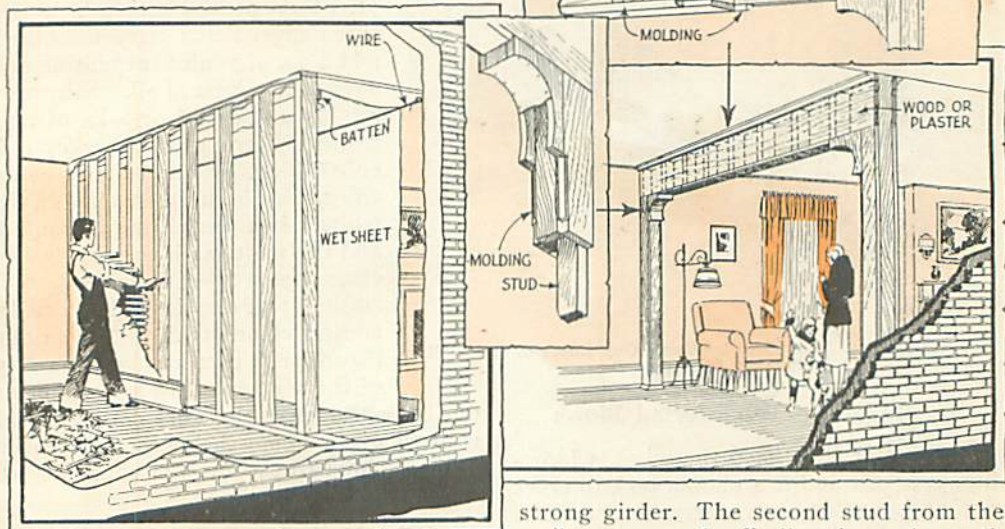
The paddle-wheel construction is comparatively easy. The hubs can be turned down to size in a lathe, or can be made from spools in which the holes are plugged and redrilled to the size of the shaft. Paddles of $\frac{1}{16}$ by $\frac{5}{8}$ by 4-in. wood are attached to $\frac{1}{8}$ -in. maple dowels ambroided into the hubs, care being taken to get the paddles perfectly parallel to the shaft. Ambroid should be used for all cemented parts, as it is waterproof.

The Mississippi steamer of Mark Twain's time was distinguished by a tall smoke-stack with fluted tops, which can be imitated by using $\frac{5}{8}$ -in. dowels and strips of tin, cut as shown. Wire crosspieces support the stacks, and the entire assembly is painted black. The wheelhouse, built on the roof of the cabin, contains the upper portion of the boiler, the round dome of the wheelhouse being taken from a 1-lb. tobacco can. A small bell, a pair of life-boats, a fire-bucket rack and a capstan are the accessories that make the craft look entirely shipshape. Any effective color combination can be used. Lacquer is preferable, as it dries in a short time. All moving parts are properly lined and oiled, including a few drops in the boiler on the water, to lubricate the inside of the cylinders and pistons, after which you are ready for the initial try-out.

☞ Kerosene can be made odorless and to burn with a light, clear flame if 1 per cent of amyl acetate by volume is added to it.

Checking Dust When Removing a Partition

I recently removed a partition in my home and replaced it with a girder, doing the work without making much muss in the next room. An efficient dust catcher



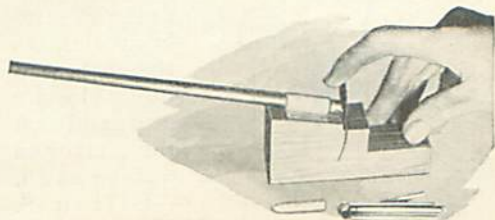
was provided by suspending wet sheets over a wire stretched across the room, near the ceiling and about 3 ft. from the partition, attaching one end of the sheets to the top portion of the partition by means of a batten, and folding the other end of the sheets under a length of 2 by 4-in. stock laid on the floor. The base-board, plaster and lath were removed, and a 2 by 10-in. plank was then nailed across the top of the studs on each side. These planks were attached with three 16-penny nails in each stud and thus formed a

strong girder. The second stud from the wall was sawed off directly underneath the girder, to provide room for working while building the columns, which were made from two or more pieces of 2 by 8-in. stock spiked to the end studs. It is essential that the columns should be a tight fit between the floor and the girder so that they have to be driven in place. The remaining studs were then sawed off and a face board nailed to the underside of the girder. Suitable molding and finishing pieces were applied and the job was complete except for the finish.—C. F. Blake, Oregon City, Ore.

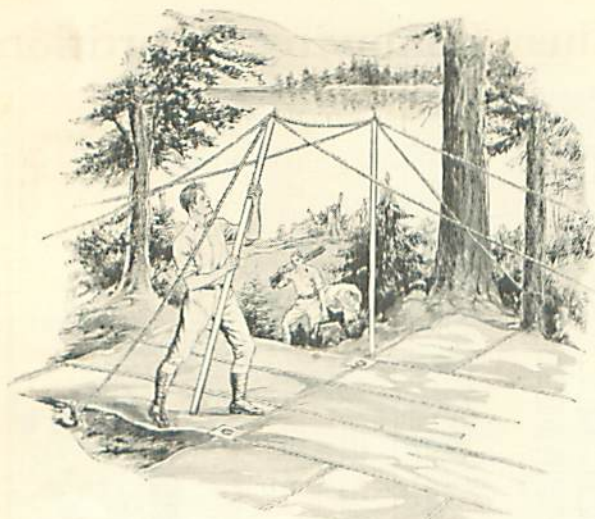
Toy Cannon Shoots Match Sticks

Mounted on a small block of wood, a length of metal tubing, held in place by a metal strap, and a small clock spring placed in a groove directly behind the tube, this toy cannon affords much amusement. A 2-in. length of clock spring, about $\frac{3}{4}$ in. wide, was found most satisfactory for the purpose, the corners being ground off. A small dent in the spring, which will come directly against the center of the tubing, can be made with a small punch, although this is not essential. The tubing is of the $\frac{1}{4}$ -in. size, which is large enough

to hold the average-size match, and it should be soldered to the strap that holds it to the block so that the action of the spring against the end will not dislodge it.



Toy Cannon That Shoots Match Sticks Consists of Metal Tubing, Spring and Wooden Block



Erection of Tent Made Easy by Using Guy Ropes to Hold Poles Until Tent Is Pegged Down

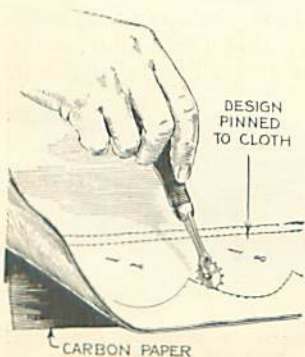
Erecting Tent While Wind Blows

No matter how hard the wind is blowing, you will find it a simple task to erect a tent by using extra guy ropes. The ropes are laid out as shown and either tied to trees or staked to the ground. They hold the poles in position and the tent can be securely pegged down.—Harold E. Benson, Denver, Colo.

Embroidery Designs Transferred with Carbon Paper

To transfer an embroidery design to the underside of the cloth, place a piece of carbon paper with the carbon side next to the surface on which the design is to be transferred. A tracing wheel is much better than a lead pencil for outlining the design, as it does not leave a smudgy line.

This method has been especially useful for "running-stitch" embroideries, as the dots can readily be counted so the stitches will be even.—Lilian S. Henderson, Lake Mills, Ia.

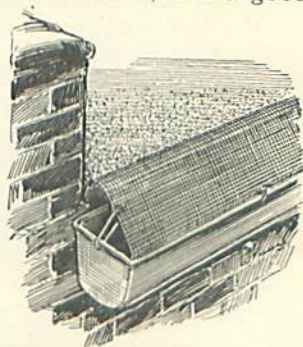


Durable and Glossy Metal Enamel

Durable glossy white enamel for metal goods can be made by dissolving 15 oz. of orange shellac and 5 oz. of copal resin in 10 pt. of denatured alcohol. After these ingredients have dissolved, add 1 oz. of venice turpentine and 4 oz. of raw linseed oil. Stir thoroughly and add 4 or 5 lb. of zinc white. Ultramarine, turkey-red, cobalt-blue, or almost any other color, may be used instead of the white. If a pastel tint is wanted, add the white as if to make white enamel and color to suit by small additions of the desired color. In adding colors to produce tints, thoroughly mix a small quantity of the pigment with a few ounces of the white enamel. This concentrated colored enamel may be used to tint the white enamel to the desired shade.

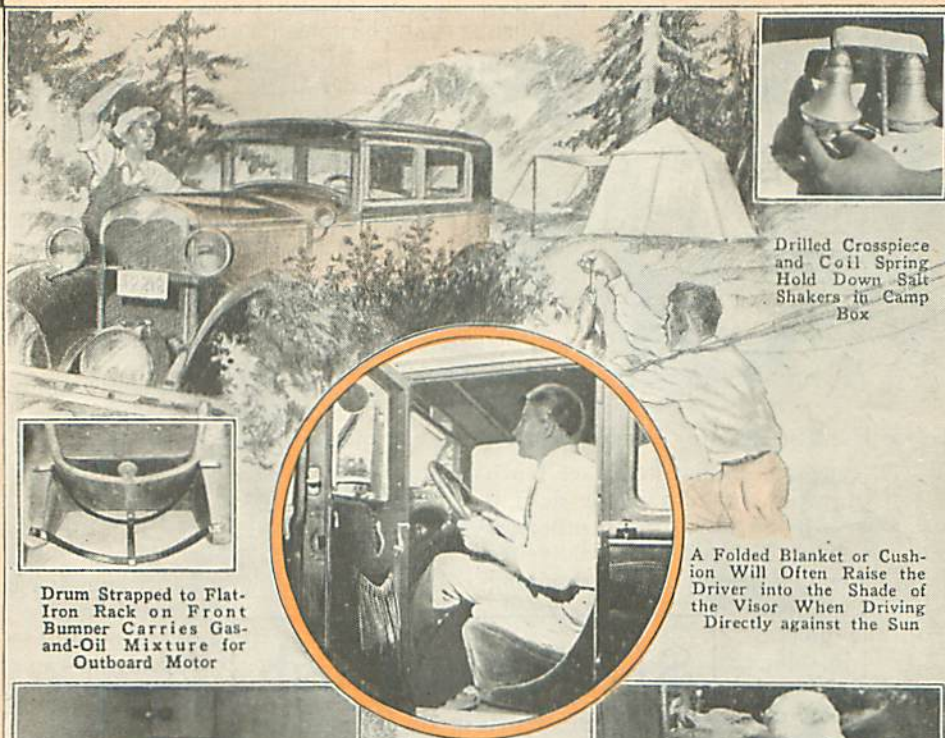
Wire-Mesh Screen Keeps Leaves Out of Eave Trough

In order to avoid clogged eave troughs caused by leaves from trees, it is a good idea to make a guard from $\frac{1}{2}$ -in. mesh galvanized wire screen. It is bent at an angle so that, when leaves wash down the roof against the guard, they do not get into the trough, but collect in spots against the guard so that the water can run around them into the trough. The guard is held in place by short pieces of galvanized wire slipped through both the wire mesh and holes punched in the trough as indicated.



☐ The bristles of a new paintbrush will be more pliable if soaked in turpentine for a couple of hours and allowed to dry; clean the brush thoroughly after using and repeat the treatment.

Practical Suggestions for Touring Motorists



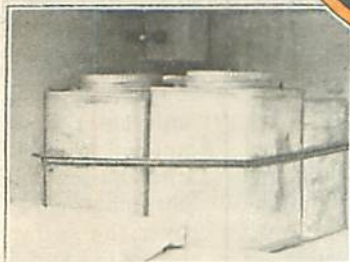
Drilled Crosspiece
and Coil Spring
Hold Down Salt
Shakers in Camp
Box



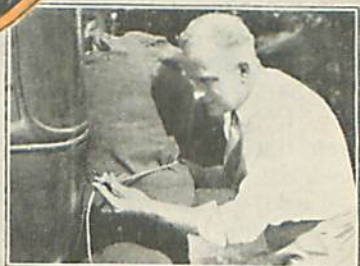
Drum Strapped to Flat-
Iron Rack on Front
Bumper Carries Gas-
and-Oil Mixture for
Outboard Motor



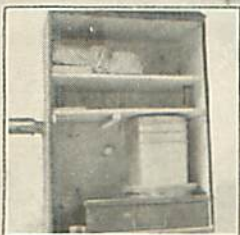
A Folded Blanket or Cush-
ion Will Often Raise the
Driver into the Shade of
the Visor When Driving
Directly against the Sun



You Can Hold Cans Se-
curely in the Camp Box
by Slipping a Screendoor
Spring around Them



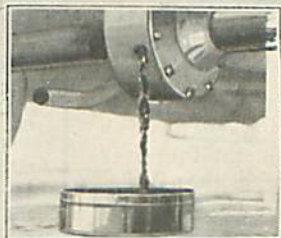
Eyebolts at the Rear Are
Useful When Strapping
On Extra Luggage



Two Auto-Valve Springs
Press Down Board to
Hold Camp Dishes Tight



China Cement Spread in
Cracks of Shatter-Proof
Windshield Keeps Out
Moisture and Prevents
Discoloration



Chain in Rear End When
Draining Prevents Oil
from Being Blown Around

Accurate Spacing of Pickets and Adjustment for Height Are Possible with This Guide



Guide Used in Erecting Picket Fence

When you are building a picket fence the top of which has a variable design, some pickets being higher than others, a guide, which can be hooked over the fence rail as shown, is useful for determining the height and spacing of the pickets. A 2 by 4-in. block is nailed to the back of the guide, and marks made on the front side indicate various heights at which the pickets are set. In use, the guide is placed against the last picket nailed in place, while the next one to be fastened is held tightly against the guide.

Flower-Garden Drain

Having trouble after a rain with waterstanding over an area that I desired to use as a flower garden, making it impossible to get the seeds to grow, I dug a pit, about 5 ft. deep and

4 ft. in diameter, in the lowest part of the garden. Into this hole, to about 18 in. of the top, I piled old tin cans, bottles and other rubbish and covered this with a 1-ft. layer of gravel. The remainder of the hole was filled with part of the excavated dirt, and the rest was spread over the garden so that it sloped toward the pit. This provided a drain to receive the surplus water.—Robert Oliver, Warwick, Mass.

How to Prepare Imitation Linoleum

Good imitation linoleum for ornamental purposes may be produced on small surfaces by applying successive heavy coats of the following surfacing compound: To 1 gal. of linseed oil add 1 lb. of litharge and 1 lb. of powdered rosin, and boil cautiously until well mixed. To this add 3½ lb. of kauri gum and continue heating and stirring until the mixture has an even consistency. The compound may be colored as desired by adding dry paint colors. It should be applied to a cloth or canvas foundation. Stretch the fabric over the surface to be coated and paint it with a sizing mixture of calcium sulphate and water of a paint consistency to fill the pores. After the size has dried, apply the surfacing compound with a brush, in successive coats, allowing each to dry before applying the next. If a more resilient surface is required, mix ground cork with the compound and apply with a trowel.

\$1,000 in Cash For Best Models of Whittling

1st prize.....	\$250
2nd prize.....	\$100
3rd prize.....	\$75
4th prize.....	\$50
5th prize.....	\$25

BESIDES this, there will be twenty-five \$10, fifty \$5 prizes, and one thousand high-grade jackknives.

Rules for "Knife-Craft" Contest

Anyone except employees of Popular Mechanics and members of their families can enter this contest, which closes July 1st, 1932. Awards will be made by a competent board of judges and in the event of a tie for any prize offered, a prize identical in all respects with that tied for will be awarded to each tying contestant.

1. One or more entries may be made. Models must be entirely of wood, and cut with no other tools than a jackknife.
2. No adhesives may be used.
3. Carvings submitted must not be painted, silvered or gilded, and will remain the property of Popular Mechanics after the contest closes.

All models must be shipped, prepaid, in suitable packages to avoid breakage. Be sure to affix tag giving your name and address on the outside wrapper of the package.

Address "Knife-Craft" Editor
POPULAR MECHANICS MAGAZINE
200 E. Ontario St. Chicago, Ill.

Small Statuettes Carved with a Pocketknife



Distinct from the usual type of wood carving, the articles illustrated here show the possibilities of expressing rugged strength and character, with no other tool to do the work than an ordinary jackknife. This kind of whittling is, of course, advanced beyond the rudimentary stages and therefore appeals to those who are quite adept. You will find endless fascination in making wooden statuettes of pictures you see in magazines, and in many cases these can be modified to suit some practical purpose. The left-hand photo shows a heavy mahogany book end incorporating an armored knight of medieval times. It should

be remembered that articles such as these do not always look well when the cutting is done with unerring accuracy and the surface finished with sandpaper—a rough-hewn effect often lends an object more beauty. The lower detail in the center shows an attractive candle holder. Note the long, graceful lines emphasized in this design. The entire object, including the figure and candle rack, may

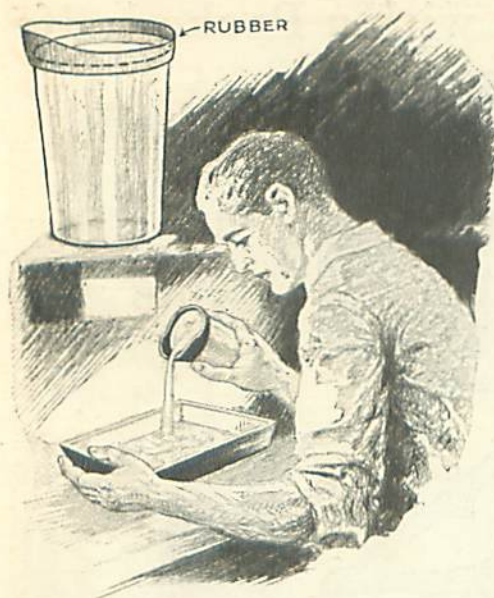
be cut from one piece of hardwood, but if soft wood is used, the grain should be taken into consideration, and it will be advisable to have the grain run lengthwise in the narrow pieces. Headless brads are used to hold the candles.

Dust-Proofing Picture Frames

A good method of preventing framed photographs from becoming discolored by dust that sifts in between the glass and picture is to attach the print firmly to the glass. If the photograph is on glossy paper, it can be fastened by thoroughly soaking it in water, after which it is pressed against the glass with a roller or other

tool and allowed to dry. The glass and print surfaces must, of course, be perfectly clean. Another method is to make a thin solution of gelatine and use this as a glue to fasten the print to the glass.

☞ Sediment in a tubful of rain water will settle to the bottom overnight, if powdered alum, 1 tablespoonful, and borax, 2 tablespoonfuls, are added to it.



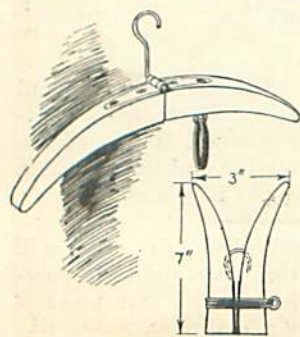
Emergency Beakers for Pouring Liquids Improvised from Tumbler and Rubber Band

Rubber Band Is Useful as Pouring Spout on Tumbler

Amateur photographers, chemists, and other who have no glass beakers or graduates at hand for pouring liquids, can quickly improvise one from an ordinary tumbler. Merely slip a rubber band, cut to the shape indicated, around the upper edge of the tumbler.

Folding Clothes Hanger Fits Suitcase

This simple clothes hanger folds up so that it is only 3 in. wide and 7 in. long, making it convenient for carrying in a suitcase or traveling bag. Take an ordinary wooden hanger and saw it in two at the center, then attach a strap hinge to both portions at the upper edge. The hinge pin is removed and a length of wire, of the same thickness, is substituted, the wire being bent as indicated, and the end peened over to hold it in the



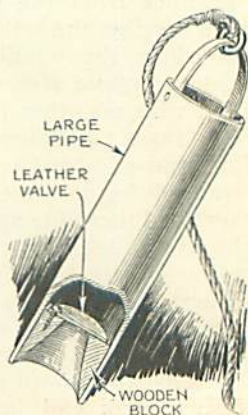
hinge. A small screw eye, driven into the underside of the hanger to hold a rubber band, is used to keep the hanger closed.

How to Clean Radiator Fins Quickly

Cleaning a radiator of small insects and flies that lodge between the fins can be quickly done with a vacuum cleaner, using a small suction tube at the end of the hose. You will be surprised at the ease with which the fins are cleaned, and, incidentally, the appearance of the radiator will be improved considerably besides making the cooling system more efficient.

Bucket Removes Sand from Well

When sand runs in and fills a bored well, stopping the water supply or making it muddy and unfit for use, use a sand bucket such as is shown in the accompanying drawing, which works on the same principle as the common well bucket but is much stronger. It consists of a length of a large pipe, a bail, a ring and a bottom made of wood, while a piece of leather, fastened with a wood screw, is used for a valve. The bottom must be tapered and driven into the end of the pipe. In use, tie the bucket to a chain or rope and let it down into the well within about 10 or 12 ft. of the sand and then let it drop. Its weight drives it into the sand, which causes the leather valve to open permitting sand to enter. Pulling it up closes the valve again.



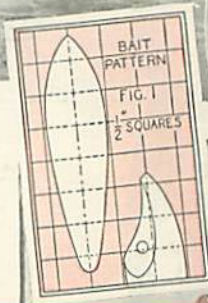
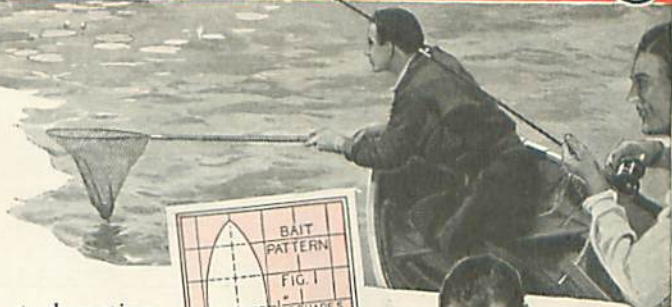
Castors on Stands Provide Rollers for Tipping Oil Drums

When making a wooden stand or rack for supporting an oil or gasoline drum, fit large castors on it, so that the drum will rest on them. Thus equipped, the drum can easily be rolled over for draining from the bung hole without lifting it.

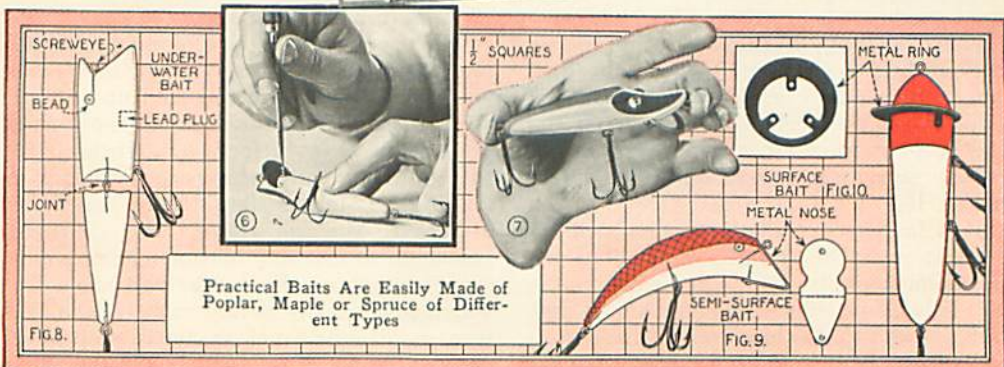
THERE'S A Thrill in Bait Casting

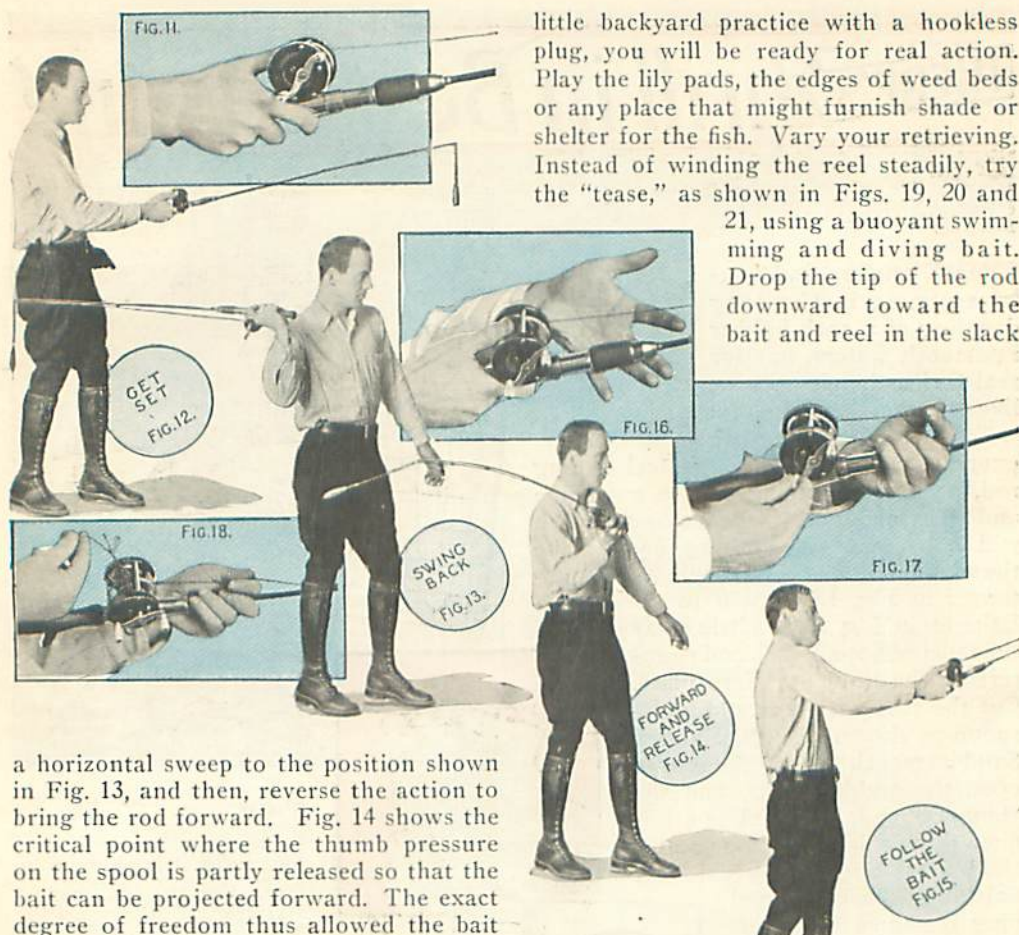
SOME anglers find contentment in the lazy dangling of a cork bobber in smooth waters, but for real thrills there's nothing like the short casting rod.

The tackle is simple enough: a split-bamboo or steel casting rod, a smooth-running reel, a good line and an assortment of wooden baits, which will cost practically nothing if you make them yourself. Try the simple "plug" patterned in Fig. 1. Turn it to shape on a lathe as in Fig. 2. Whittle away the tapered nose, Fig. 3, and countersink the bead eyes into place. Cut the scoop from an old tablespoon as shown in Figs. 5 and 6. Sand it smooth and add the screw-eyes, the treble hooks, and the "bumper" nail, Fig. 4. Use a lacquer base, a lacquer color and a clear gloss-lacquer top coat for finishing. The completed plug is shown in Fig. 7. Fig. 8 shows an underwater bait, weighted so that it will sink fairly deep into the water when retrieved. A semi-surface type is shown in Fig. 9, while a surface bait is



shown in Fig. 10. To make a cast, reel in the bait until it is about 6 in. from the tip of the rod. Release the click, or drag, and press the ball of the thumb firmly upon the spooled line so that the reel does not unwind faster than the line is payed out. Figs. 11 and 12 should give you a fair idea of the proper starting position. Swing the rod back in





little backyard practice with a hookless plug, you will be ready for real action. Play the lily pads, the edges of weed beds or any place that might furnish shade or shelter for the fish. Vary your retrieving. Instead of winding the reel steadily, try the "tease," as shown in Figs. 19, 20 and

21, using a buoyant swimming and diving bait. Drop the tip of the rod downward toward the bait and reel in the slack

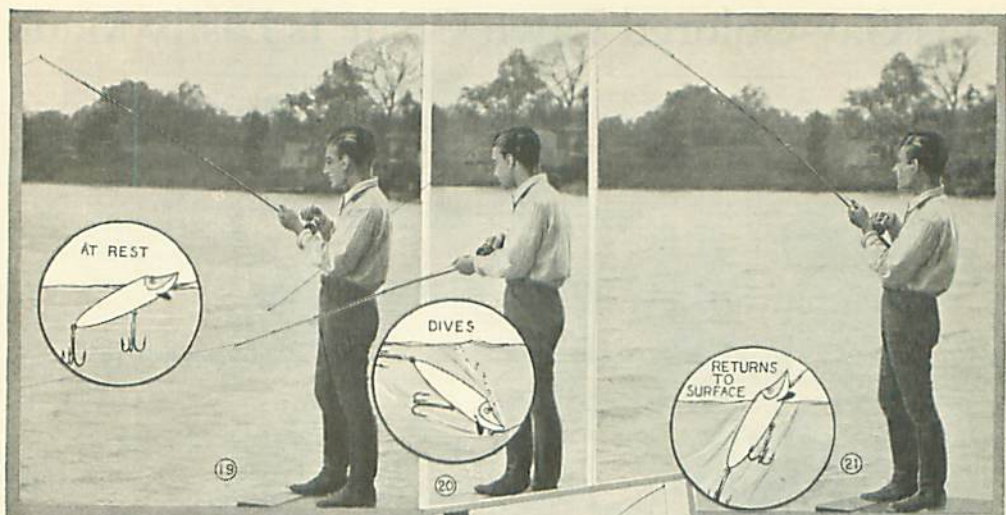
a horizontal sweep to the position shown in Fig. 13, and then, reverse the action to bring the rod forward. Fig. 14 shows the critical point where the thumb pressure on the spool is partly released so that the bait can be projected forward. The exact degree of freedom thus allowed the bait is something impossible to describe, as the thumb does not leave the spool entirely. Neither must it lift so little as to retard the motion of the line. It's simply a matter of letting go, which practice alone can show you. After the release, the thumb pressure should gradually be increased to stop the line at the exact moment the bait strikes the water.

When reeling in the bait, the rod is grasped by the left hand slightly ahead of the spool, as in Fig. 16, and the line is guided onto the reel as in Fig. 17. If the line becomes tangled, a bent hairpin will usually straighten it out again, as shown in Fig. 18.

Skill in bait casting lies in controlling the line with the thumb. Thumbing the line is most easily done when the spool is well filled, and if the casting line is not long enough to do this, sufficient common line should be first wound on it. After a

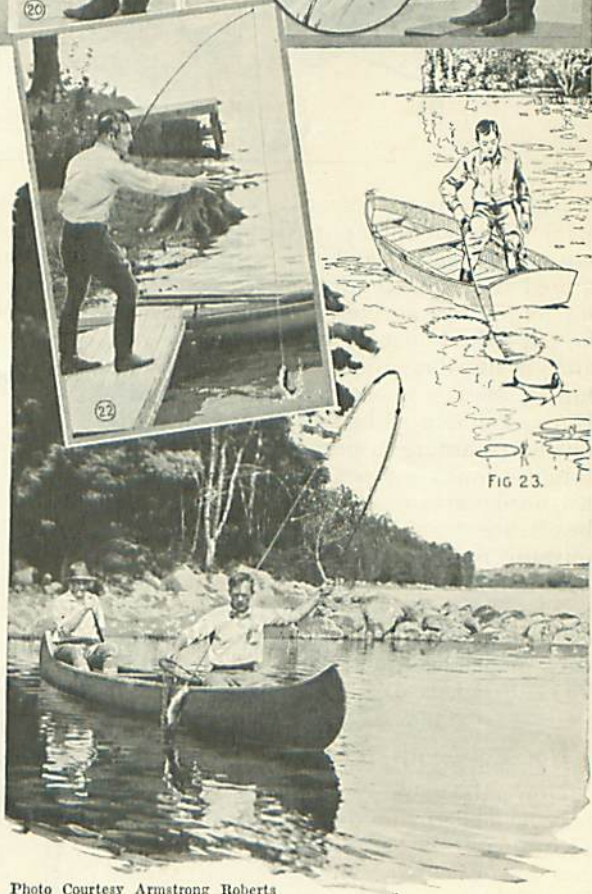
line without disturbing the plug, which should be floating motionless on the water. Then, jerk the tip of the rod upward and stop abruptly. Repeat the motion. What you get is a little wave running along the line's length to the bait, and a duck-down and pop-up action, which is often highly effective for catching fish.

When you get a strike, don't be in too much of a hurry to reel the fish in. Take your time. Hold the rod well up so that the fish will be fighting against the spring of the pole. Watch for a final rush about the time you think things are ripe for a landing. Landing should very rarely be done with the rod alone. Use a net or gaff or bring the fish within reaching distance and grasp it just behind the gills, which temporarily paralyzes it. If the fish is a small one, reel in until you have about a rod's length of line out; then



swing up the tip and land the fish with the line in hand, as shown in Fig. 22. White or light-colored surface baits usually give the best results when the sun is low. On bright days and in clear water, red, white, and red and white or green plugs are the best baits. A brown and green or other dark-colored line is preferable to the black and white, white or light-colored variety.

Use leather gloves when extracting the hooks from large fish such as muskellunge and pike, as their teeth and gill covers can inflict rather painful wounds. You will learn that these two species are notorious "followers," often following the bait in plain sight to the very last turn of the reel. It is then advisable to perform the little stunt shown in Fig. 23—plunging the rod into the water and moving it vigorously in the path of a figure eight in order to lure the fish to strike.



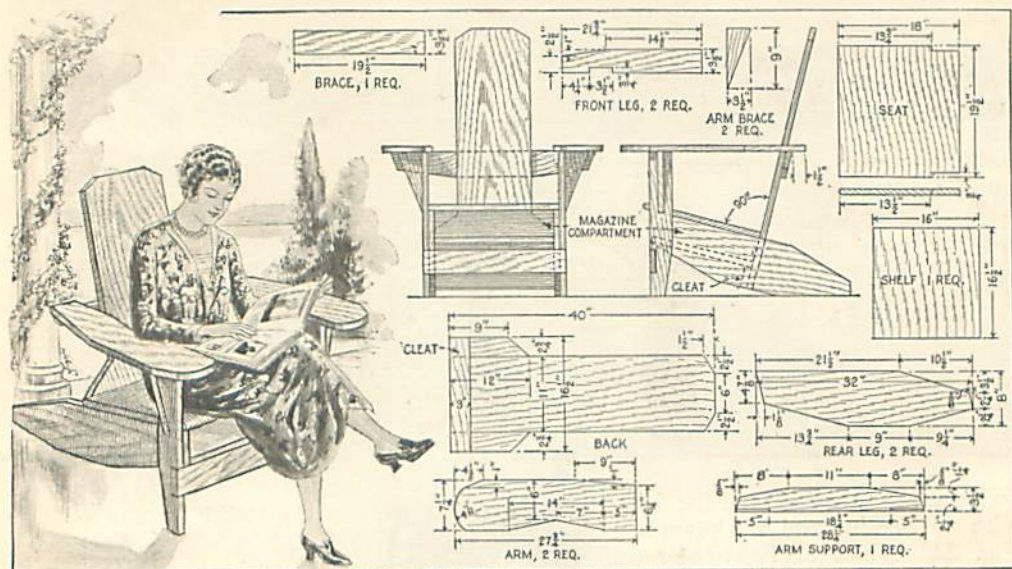
Cooking Strawberries in Sun Rays

Strawberries can be cooked in the rays of the sun to preserve them. They are placed in glass-covered containers to protect them from dust and are then exposed to the sun rays until cooked to the proper stage, after which the berries

Photo Courtesy Armstrong Roberts

are packed in sealed glass jars for marketing. Tests have shown that strawberries preserved in this way will retain their delicious flavor and the vitamins they contained when picked.

This Gay-Colored Lawn Chair Is Easily Made



Here's a lawn chair that can be constructed by any home mechanic at a cost not to exceed \$2, and the only tools required are a saw and hammer, a brace and bit and a screwdriver. All pieces are to be cut exactly according to the drawing, and, if the dimensions are carefully followed, they will fit together perfectly. Nails may be used in assembling the various parts, but, for a permanent job, I have found it much better to use 1½-in. No. 10 flat-head screws, countersunk until the heads are flush. The wood used for the purpose may be either clear pine or cypress of ¾-in. thickness. After the chair has been assembled, it should be given two coats of paint or one coat of paint and one of enamel, the color scheme being left to you.—Frank L. Wade, Tampa, Fla.

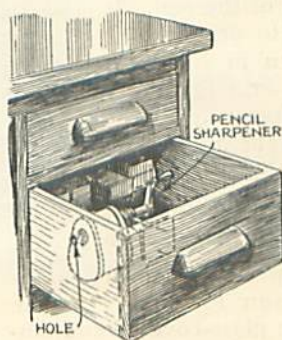
Non-Poisonous "Pharaoh's Serpents"

Non-poisonous "Pharaoh's serpents" may be made by mixing 4 oz. of potassium dichromate, 2 oz. of potassium nitrate and 6 oz. of sugar. The ingredients should be weighed out and separately ground to fine powders with a mortar and pestle. After grinding, mix them in a mortar with just sufficient water to make a thick, tacky paste. Rub to an even consistency and mold into small cones in pieces of paper

rolled to a funnel shape. When the cones are thoroughly dry they may be lighted. If a quantity of the cones are made, they should be packed in boxes and kept away from light and moisture.

Pencil Sharpener Fastened Inside of Desk Drawer

Here is a method of keeping the pencil sharpener out of the way, yet available at all times. Enlarge the holes in the base of the sharpener, and then use a small round file to form ¼-in. slots on one side of each hole so that the base can be slipped over two screws driven into the end of the drawer. So mounted the sharpener can be removed or replaced when-ever necessary to empty the shavings. There is plenty of space for turning the crank, and a hole bored through the side of the drawer, in line with that of the sharpener, allows the pencil to be inserted.



How to Make Dry Cells

Frequently experimenters require a dry-cell battery of special size and shape. For this purpose cells can be made as needed. Solder up a zinc can of the desired size and shape. Procure a carbon of suitable size to insert as the positive pole. The carbon should not touch the zinc can which serves as the negative pole of the cell when the assembly is complete. The space between the carbon and the can is filled to within a fraction of an inch of the top with a mixture consisting of 1 lb. of zinc oxide, 1 lb. of ammonium chloride, 1 lb. of zinc chloride, 3 lb. of plaster of paris and 2 pt. of water. Mix the ingredients thoroughly and fill the zinc containers. It is a good plan to line the zinc cans with moist blotting paper before filling them with the paste. The cells are then sealed by pouring melted tar, paraffin or sealing wax over the top. An approximate potential of $1\frac{1}{2}$ volts is obtained from each cell.

Straining Cloth Clipped to Bucket with Clothespins



enabling one to avoid getting paint on his hands.

Increasing Shelf Space in Closets

Most closets have a baseboard that can be utilized to advantage to increase the shelf space. Place boards, cut to the correct dimensions, across the baseboard. This provides considerable space for shoes, rubbers, etc., underneath, while the shelves can be used for other purposes.



Camera View Finder Reflected by a Mirror When You Cannot Get behind It

Mirror Reflects Camera View Finder

When taking interior views in a small room, with the camera set up in a corner, you can easily determine what part of the scene is within the range by using a mirror as shown. It is tilted at an angle above the view finder so that you can see the image as easily as if you were behind the camera.

Rubber-Band Wringer and Holder for Artists' Brushes

Lettering brushes used by artists and showcard writers can be wiped to a "chisel" point by drawing them through narrow slots cut in a rubber band stretched around the upper portion of a tumbler. Rubber bands for this purpose can be obtained from auto inner tubes of the right size. To hold brushes not in use, cut a few notches in the band so that they can be laid in them as shown in the drawing.



When using gasoline as a cleaning agent, no rings will be left if a little salt is dissolved in it beforehand.

Fun at the Beach with

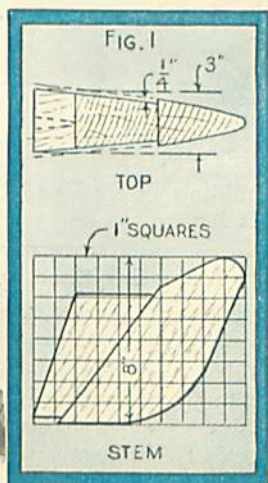
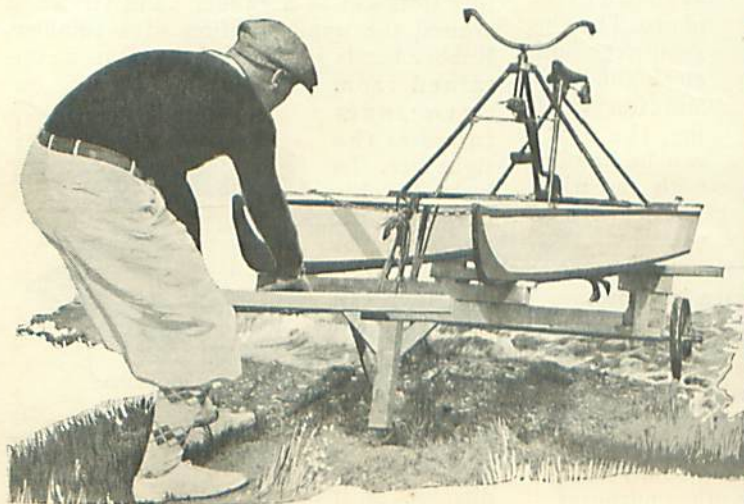
by
R.M. Roland



able shafting. The frames of the pontoons, both of which are exactly alike, are made of 1 by 2-in. white pine, which, when dressed, is exactly $\frac{7}{8}$ by $1\frac{7}{8}$ in. in size. Dimensions for the top and bottom crosspieces and their spacing are clearly indicated in Figs. 2 and 4. Each frame consists of four pieces glued (marine glue) and screwed together, and notched to receive the longitudinal members—sheer and chine battens. Both stem and stern are set at an

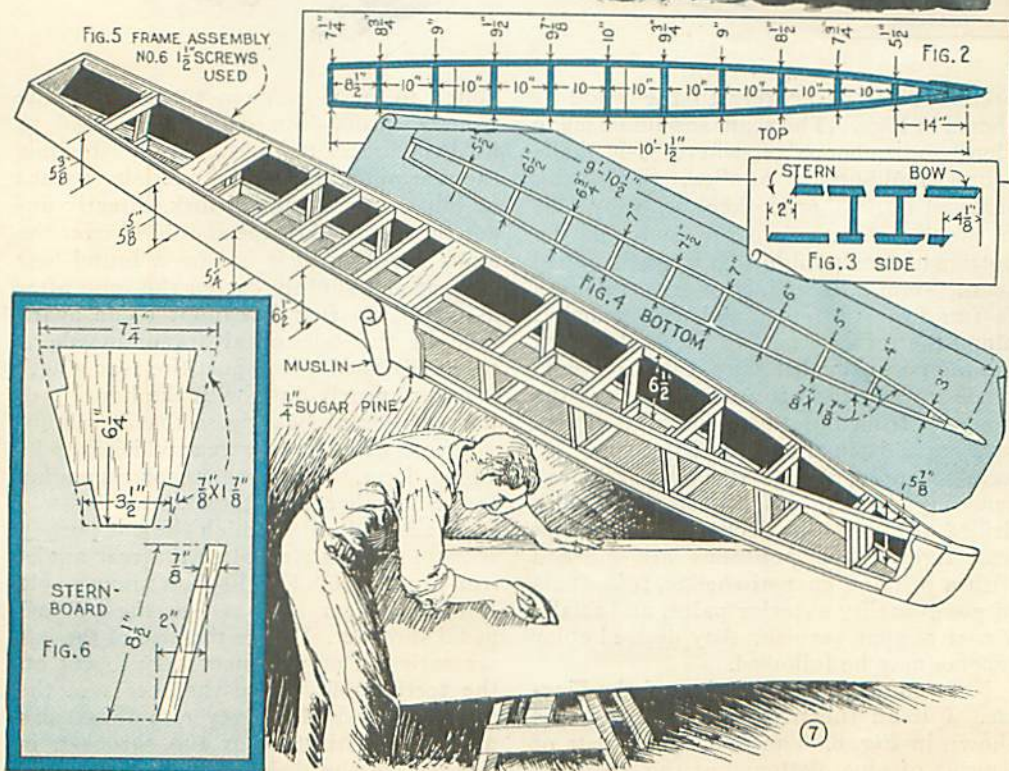
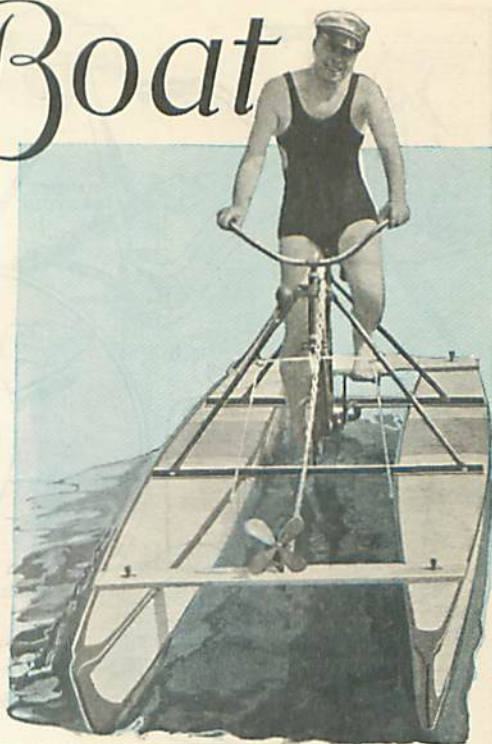
BUOYANCY and speed are two features of this bicycle boat which was built for vacationists at a lake near Chicago and used a whole season. It consists of two pontoons and an old bicycle frame, held centrally above and between the former. Propulsion is obtained by the use of a ring-and-pinion gear, bolted to the pedal sprocket, and a small three-blade propeller connected to the gears by a suit-

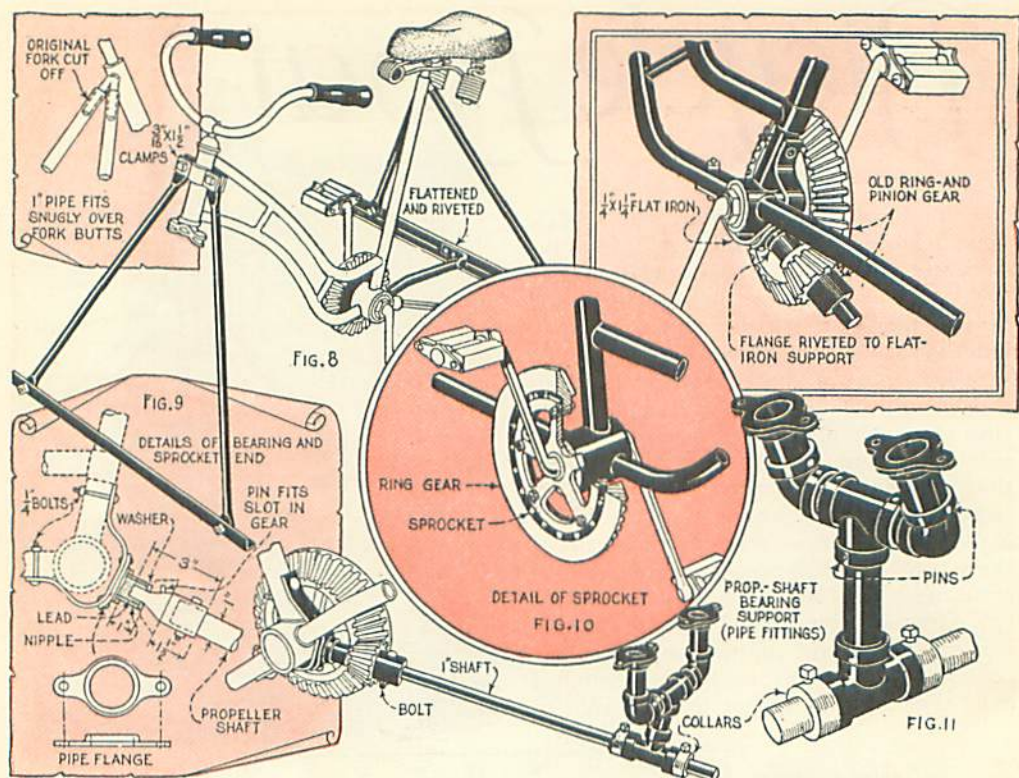
angle, which should be taken into consideration when building the frame (see Fig. 3). Details of the stem or nose block, which is cut from a piece of 2 by 8-in. spruce, are given in Fig. 1, part of the side being recessed $\frac{1}{4}$ in. to take the side planking. Exact dimensions and method of cutting the stern from $\frac{7}{8}$ -in. ash are given in Fig. 6. Note the additional reinforcing pieces provided across the top



a Bicycle Boat

for the braces that support the bicycle frame, besides those that reinforce the deck directly under the rubber mats. When the frame has been finished, the side and bottom planking, which is cut from 12-ft. lengths of $\frac{1}{4}$ by 12-in. sugar pine, is screwed on after the contacting portions of the frame have been covered with marine glue. Then, with the top off, the inside of the pontoons is given an application of paint, and the top, also of $\frac{1}{4}$ -in. sugar pine, is glued and screwed on, using $\frac{3}{4}$ -in. flat-head brass screws. The heads of the screws should be countersunk, and the resulting holes filled with hard water putty. After sanding each pontoon smooth, it is given a liberal application of airplane cement, and heavy muslin is stretched over the surface. A hot iron is used to

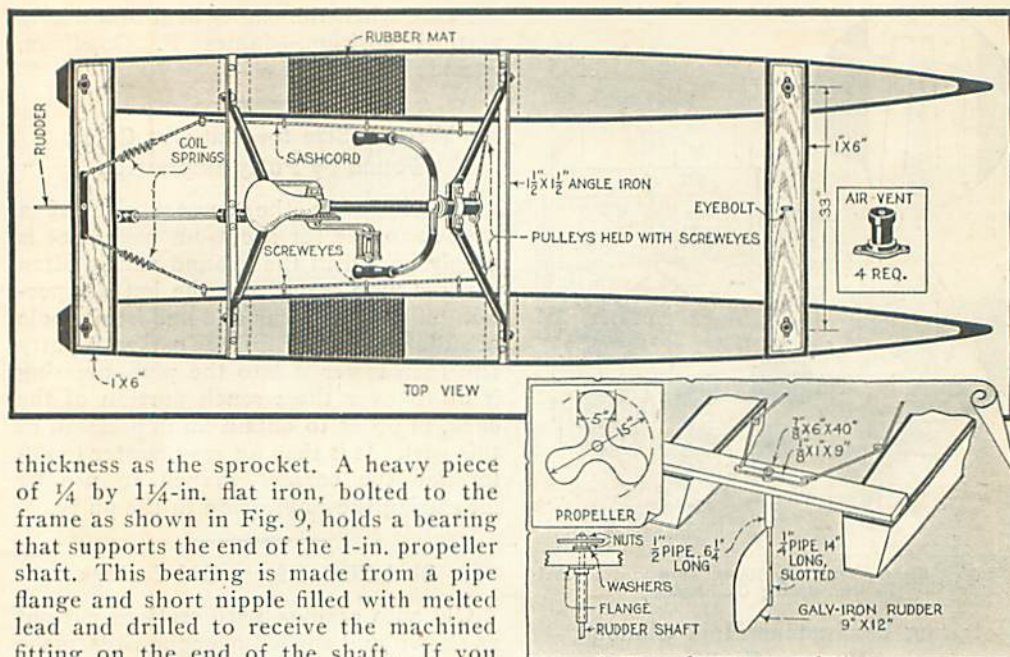




press the cloth securely to the wood as shown in Fig. 7. The seam should be made along the upper edge, where $\frac{1}{2}$ -in. half-round molding is applied, this being screwed on. A spruce keel of $\frac{7}{8}$ by $1\frac{1}{4}$ -in. stock is screwed to the center of the bottom of each pontoon. It is neatly joined to the stem, after which a strip of brass is run over the stem and a few inches along the forward part of the keel. Each pontoon is provided with two air vents made up of pipe fittings, to prevent the pontoon from bursting when the air inside expands in the heat of the sun. Be sure to apply glue to the fittings before screwing them in place over small holes drilled through the deck, to make them watertight. The pontoons are finished with a priming coat of shellac, four coats of good-quality exterior paint, and finally a coat of spar varnish. Any desired color scheme may be followed.

Next comes the adaptation of the bicycle. Cut off the front and rear forks as shown in Fig. 8. The bracing consists of lengths of pipe, flattened at the ends and

bolted to angle-iron crosspieces. At the front end, flat-iron clamps are used to hold the braces to the steering post, while the rear pipes are slipped over short stubs or butts of the original fork, directly under the seat. The pipe should fit over the stubs snugly, and it has been found best to heat and slightly flatten the joint after assembly, so that it cannot come apart. One of the horizontal frame members, originally used to support the rear wheel, is cut off nearly flush with the housing of the pedal-crank bearing so that it will not interfere with the ring gear which is to be added later. The other corresponding frame member is cut off about halfway from the end, after which the cut portion is flattened and riveted to the rear angle-iron crosspiece. Fig. 10 shows how an old Ford ring gear is bolted to the original pedal sprocket. Where the size of the latter varies, it may be necessary to cut off the teeth to fit inside the recess of the gear. If desired, however, a brass disk may be substituted for the sprocket, in which case the disk should be the same



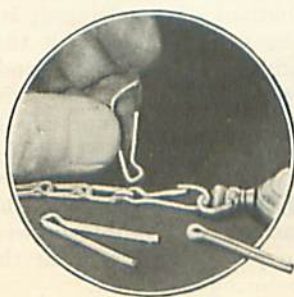
thickness as the sprocket. A heavy piece of $\frac{1}{4}$ by $1\frac{1}{4}$ -in. flat iron, bolted to the frame as shown in Fig. 9, holds a bearing that supports the end of the 1-in. propeller shaft. This bearing is made from a pipe flange and short nipple filled with melted lead and drilled to receive the machined fitting on the end of the shaft. If you have no metal lathe, this fitting can be turned out quickly at any machine shop. The tapered portion should make a snug fit in the pinion gear, and a small pin, driven into the tapered portion, serves as a key for the gear. A bolt holds the fitting on the shaft, while the latter runs through a bearing provided directly under the rear angle-iron crosspiece. This bearing and its hanger are made up of pipe fittings as shown in Fig. 11.

The angle-iron crosspieces are fastened to the pontoons with lagscrews in the approximate positions indicated in Fig. 12, and additional crosspieces of 1-in. stock are provided at the front and rear. The pontoons should be placed perfectly par-

allel, 33 in. from center to center. Steering is accomplished by means of a small sheet-metal rudder, connected with sashcord to the front-fork stub of the bicycle. If a commercial propeller is not available, one can be made from fairly heavy sheet metal. It should have a 15-in. diameter, with a hole drilled centrally to fit the shaft, the end of which is threaded so that the propeller can be held securely between two nuts. Corrugated rubber mats are tacked to the deck of the pontoons on each side of the bicycle, and the craft is then ready to go. A two-wheeled trailer can be made to carry it about from place to place.

Snap Hooks Made from Cotter Pins

By bending a cotter pin as shown, strong snap hooks can be improvised. The ends of the pin are spread apart, one end is cut off about halfway



and the other then bent over it so that the two tips will overlap. Such snap hooks have been found strong enough to use for watch chains and key rings.

Woolen Cloth Picks Up Broken Glass

Bits of broken glass can be picked up quickly from almost any surface with a woolen cloth. The pieces of glass become entangled in the wool fibers from which they can later be brushed or shaken out.



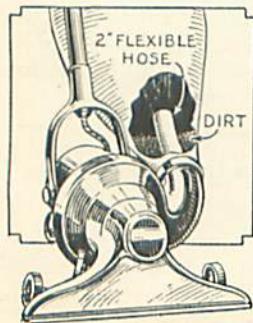
Climbing Plants, Especially Roses, Supported on Trellis with Spring Clothespins.

Spring Clothespins Hold Climbing Vines to Trellis

Instead of stapling or tying climbing vines to wooden trellises, a practice which is generally followed, you will find that spring clothespins will prove useful for this purpose. Long slender brads are driven through one part of the clothespin to hold it on the trellis, permitting the other part to be pushed open for insertion of the vines. If the jaws clamp the vines too tightly, take a round file and make a deep notch so that when the pin is closed, the vines will not be pinched.

Improvement on Vacuum Cleaner

Your vacuum cleaner can be made more effective by attaching a length of flexible non-collapsible hose to the blower exit inside the back, pushing it upward into the latter for several inches, as shown in the drawing. It lets the dust enter the bag freely without the interference of that settling at the bottom around the exit opening, which is naturally



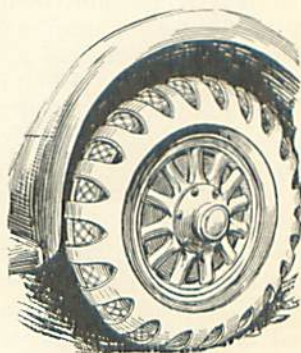
the case when the bag is held in a nearly vertical position.—James F. Goodman, Stockbridge, Mich.

Wrench Size for Cut-Out Cocks Found by Putty Impression

To determine the correct size of a wrench to use for a cut-out cock that is deeply buried in the ground and is often covered with water, cut the bottom portion off a tobacco can and nail it to a pole of suitable length. Fill the can with putty and then lower it into the pipe, pressing it down over the wrench portion of the cock, in order to obtain an impression of this part. It is then an easy matter to determine the correct wrench to use by measuring the impression in the putty.

Skid Chains from Old Casings

Old auto casings, with sections cut out as shown and slipped over the tires, make a good substitute for skid chains that has been found satisfactory and will give long wear. They are especially useful where it is necessary to drive on both dirt roads and pavement, as they are much more durable than the regular tire chain, which quickly wears out.



Simple Repair for Broken Nail Set

Don't throw away your old nail set when the point chips or breaks. A good method of repairing it is to first anneal the point, prickpunch the center of the end and then drill the end just enough to form a new cup, after which the point is hardened and tempered. This will make it as good as new.

Collodion is a good substitute for shellac to cover knots in wood, preparatory to painting, to prevent the sap from discoloring the paint.

PAGES

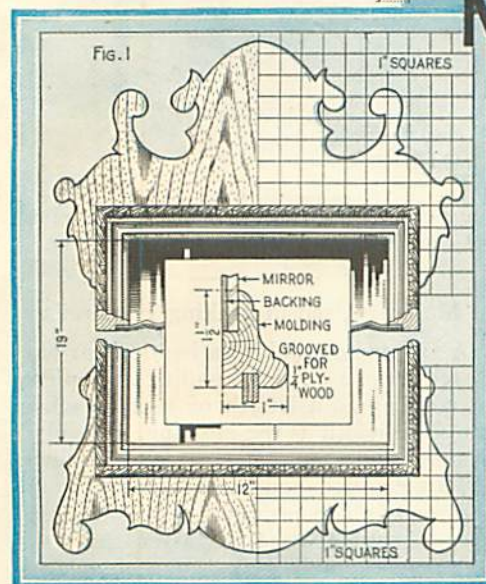
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MISSING

Necktie Rack

HERE'S a necktie rack that is out of sight when not in use, as it is built on the back of a mirror. The construction is so simple that anyone can build it with a few hand tools.

The mirror frame is made first, a hand coping saw or bandsaw being used to cut the curved parts. To follow the exact design shown in the drawing, first make a template on 1-in. squares, which can be transferred to the wood by means of carbon paper. For these

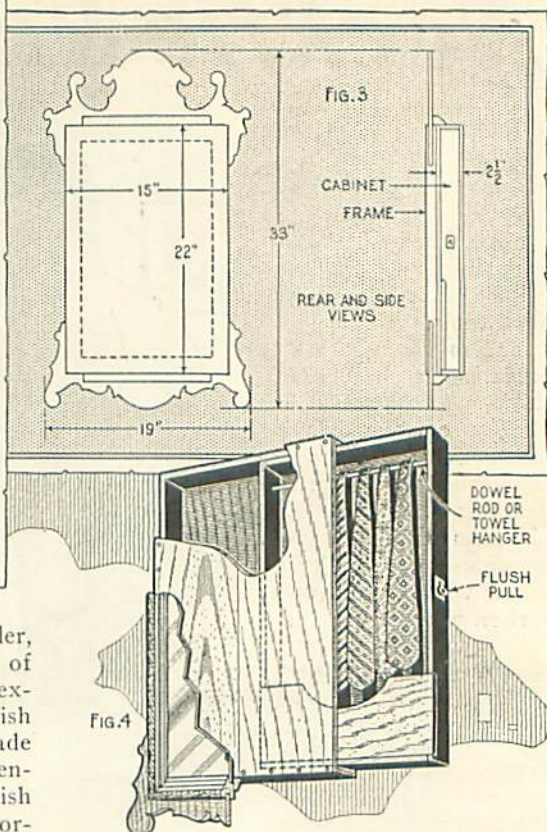
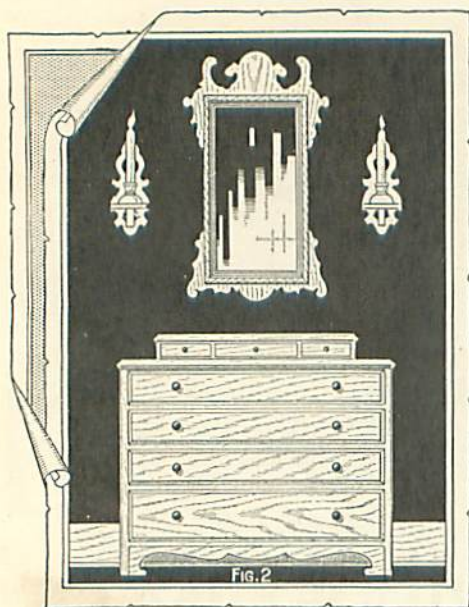


scrollsawed parts, $\frac{1}{4}$ -in. plywood will be found the best material. The inner edges of the top and bottom pieces must be perfectly square to fit into the grooved molding, as in Fig. 1. Almost any suitable design of molding can be used, although that shown is particularly fitting for the Chippendale design. All parts of the frame

are glued together and clamped until dry. The mirror is then fitted in place and reinforced by a $\frac{1}{8}$ -in. plywood backing. Next comes the necktie cabinet, the construction of which is shown in Figs. 3 and 4. It consists of an outer box in which the drawer or cabinet slides out at one side, a flush pull being installed to facilitate handling. A hardwood dowel or an ordinary towel hanger is fitted at the upper part of the cabinet to hold the ties, and it is evident that a considerable number of ties can be accommodated. A piece of plywood is fitted across the lower portion of the cabinet, so that the ends of the neckties will be held behind it, preventing them from being caught when the cabinet is closed.

For making the box and cabinet, $\frac{1}{4}$ -in. soft wood is used. Although nailing the parts together will be found to provide sufficient strength, the use of small flat-head screws is preferable. If still better workmanship is desired, grooved and glued joints may be substituted for ordinary butt joints. When the construction is finished, the wood is carefully sandpa-

By H. L.
WEATHERBY



pered smooth, coated with a suitable filler, stained and then given a priming coat of shellac. For the final finish of the exposed portions, a good grade of varnish should be applied, which may be made smooth by the use of powdered rottenstone and rubbing oil. A wax polish after that will give a high luster. In order to avoid sticking of the cabinet in its housing, it should be given a coat of paraffin. The finished mirror and cabinet can be attractively mounted over a chest of drawers, as shown in Fig. 2, picture hooks being driven into the wall to support it instead of suspending the cabinet from the molding by means of wire.

Rubber Stoppers for Large Glass Jugs

Ordinary rubber sink stoppers, obtainable at any hardware store, can be used on glass jugs, and the frequent annoyance of losing the stopper can be avoided by tying a stout cord or light chain to both stopper and bottle. The



plug can be quickly washed and the small ring attached to it forms a finger grip.

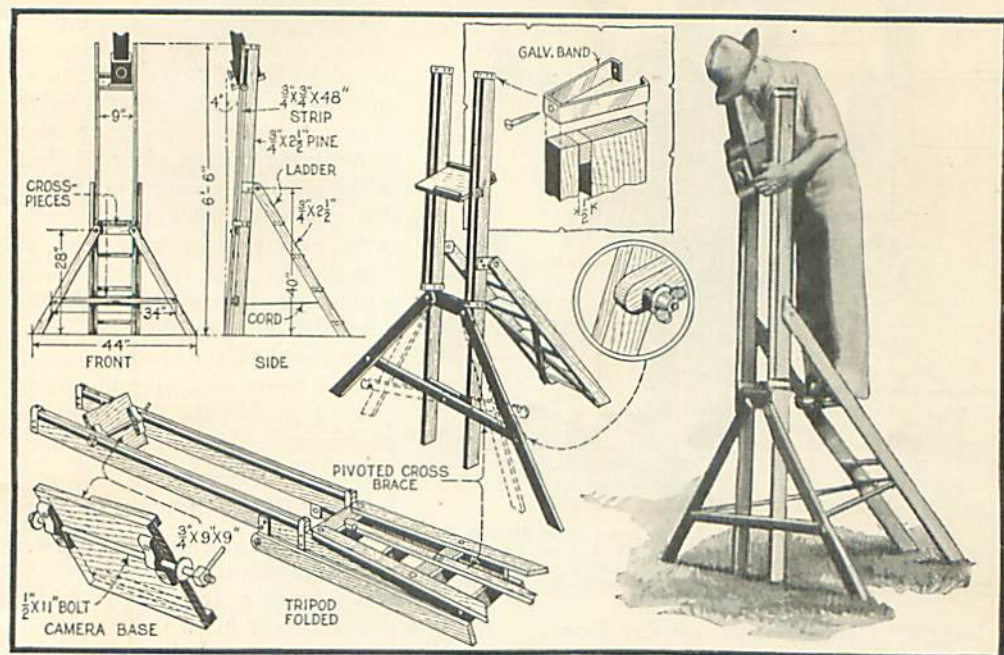
Molding Used in Making Handrails

A satisfactory job of a handrail or banister can be done by nailing two pieces of molding to a length of $\frac{3}{4}$ -in. stock of the same width as the molding. This gives symmetrically curved sides and produces a fitting which compares favorably with the ready-made product. Finishing nails are, of course, used to fasten the strips together, the nails being countersunk and filled before finishing.

Flexible Waterproof Sizing for Cloth

Cloth can be given a flexible waterproof size by first dipping it in a solution of white-soap chips, using 1 lb. of chips to 1 gal. of water. Then allow the cloth to dry and dip in a hot solution of alum, $\frac{1}{2}$ lb. to each gallon of water.

Ladder Tripod for Taking Overhead Photos



In "shooting" subjects from a high angle, the standard camera tripod is hardly adequate, especially in the case of a Graflex, where the photographer must look into the top of the finder. The tall "stepladder tripod" has all the range of an ordinary tripod and, in addition, can take pictures almost directly over the subject. With the new speed films, it is particularly handy for slow snapshots in the house, and is light enough to be carried easily. Legs and stepladder fold flat against the main frame so that it can be carried on a car or stored in small space. Dimensions and constructional details are given in the drawing. Photos can be made from a still greater height simply by lengthening the parallel uprights and the stepladder.

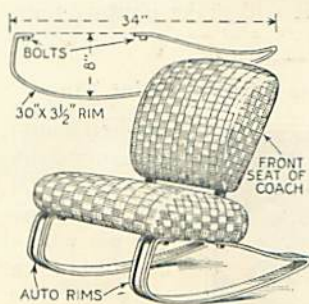
Removing Rust Stains

Stubborn rust stains can usually be removed by covering the moistened spot with a mixture consisting of 1 oz. of tartaric acid and 1 oz. of ordinary potash alum. After the damp powder has been left on the spot for a few minutes, it may be removed by rinsing. If the spot has not been completely removed, the process

should be repeated. For new rust stains the above-mentioned proportions of chemicals may be dissolved in sufficient water to make 16 oz. of solution.

Coach Seat Makes Rocking Chair

One of the front seats from a coach-type automobile can be readily converted into a serviceable rocking chair. The curved rockers, which are bolted to the underside of the seat, are formed from old, 30 by 3 1/2-in. Ford auto rims. The upper detail of the illustration gives the dimensions and curvature to which the rims should be bent. It is advisable to heat them to avoid fracturing when bending.



When making up paint with white lead, it is easier to brush on if the mixture is allowed to stand about a week before using.



Light Boxes with Sheet-Metal Hooks Hold Camping Equipment on Car Door without Interfering with Window Action

Luggage Carrier Hooks on Car Door

Camping equipment that is needed daily can be stored in convenient carriers attached to the outside or inside of the car doors, so that it is readily available without the necessity of going through the trunk or unpacking other equipment. Each luggage box is provided with two hooks of rather light metal that fit in the slot between the door and the glass so that the action of the window will not be interfered with. Wide rubber bands slipped over the hooks may be used to protect the finish of the car, and it is also well to provide rubber-headed tacks on the back of the box where it will make contact with the door.

Paper Pie Plate Absorbs Paint Rings



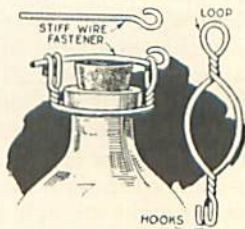
When painting around the house, you will find a paper pie plate useful as a tray for the paint can, in order to prevent stains on the floor or rug. The pie plate also provides a convenient place to "park" the brush.

Celluloid Sheet Holds Objects for Photographic Purposes

After experiencing difficulty in getting a pure white background for photographing small fruits and flowers, the Maine department of agriculture used a 2-ft. wooden frame fitted with a piece of clear celluloid. Holes were punched in the celluloid and large thumb-tacks were pressed into them, so that the points of the tacks would project on the opposite side and hold the fruit or flowers. This sheet could be set up in any position in front of a suitable background, so that the fruit could be photographed without shadows.

Keeping Bottle Stoppers in Place

For holding a bottle stopper tightly in place, a fastener can be made from a length of rather heavy wire. It is cut in two parts, one of which is wrapped around the neck of the bottle, twisting it so that a loop is formed at one end and a couple of hooks at the other. One end of the other piece is bent to form an eye to engage the loop. In use, the stopper is inserted, the cross wire placed over it and is then fastened under the hooks.



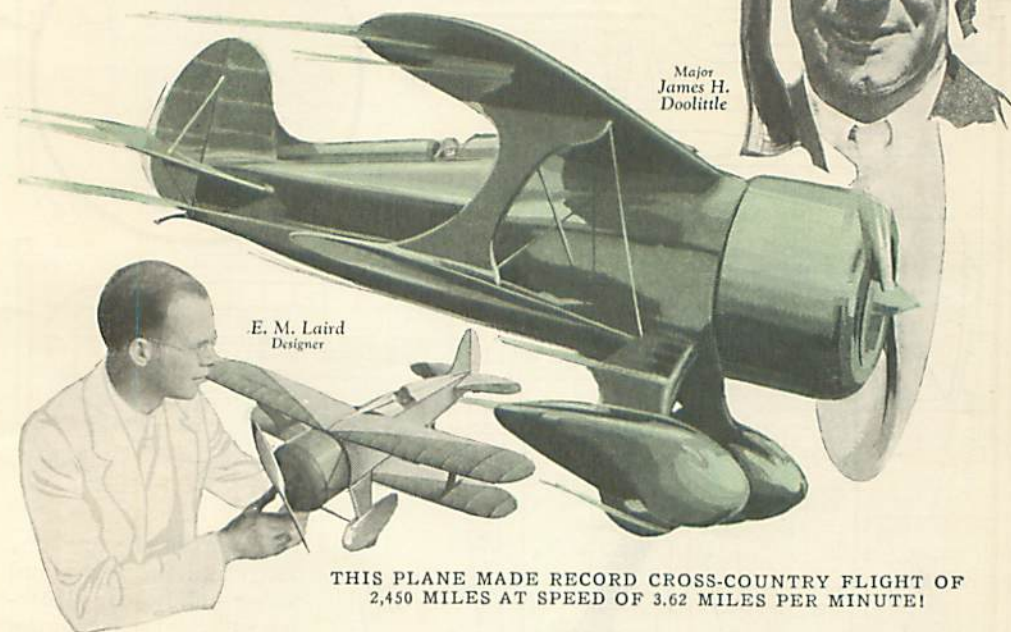
Where to Plant Climbing Roses

Roses of the climbing varieties that are planted near buildings often develop powdery mildew, which is caused by lack of air. If they are planted along fences or trellises where the air can circulate around them they are not likely to mildew, especially such varieties as the Crimson Rambler and Dorothy Perkins, which are more susceptible to the disease.—E. G. Moore, Washington, D. C.

¶ If canned strawberries are turned over several times while the cans are cooling, the berries will float separately in the sirup, making a better-looking preserve.

"JIMMY" DOOLITTLE'S Super-Solution

Record-Breaking Transcontinental
Racing Plane of 1931



THIS PLANE MADE RECORD CROSS-COUNTRY FLIGHT OF
2,450 MILES AT SPEED OF 3.62 MILES PER MINUTE!

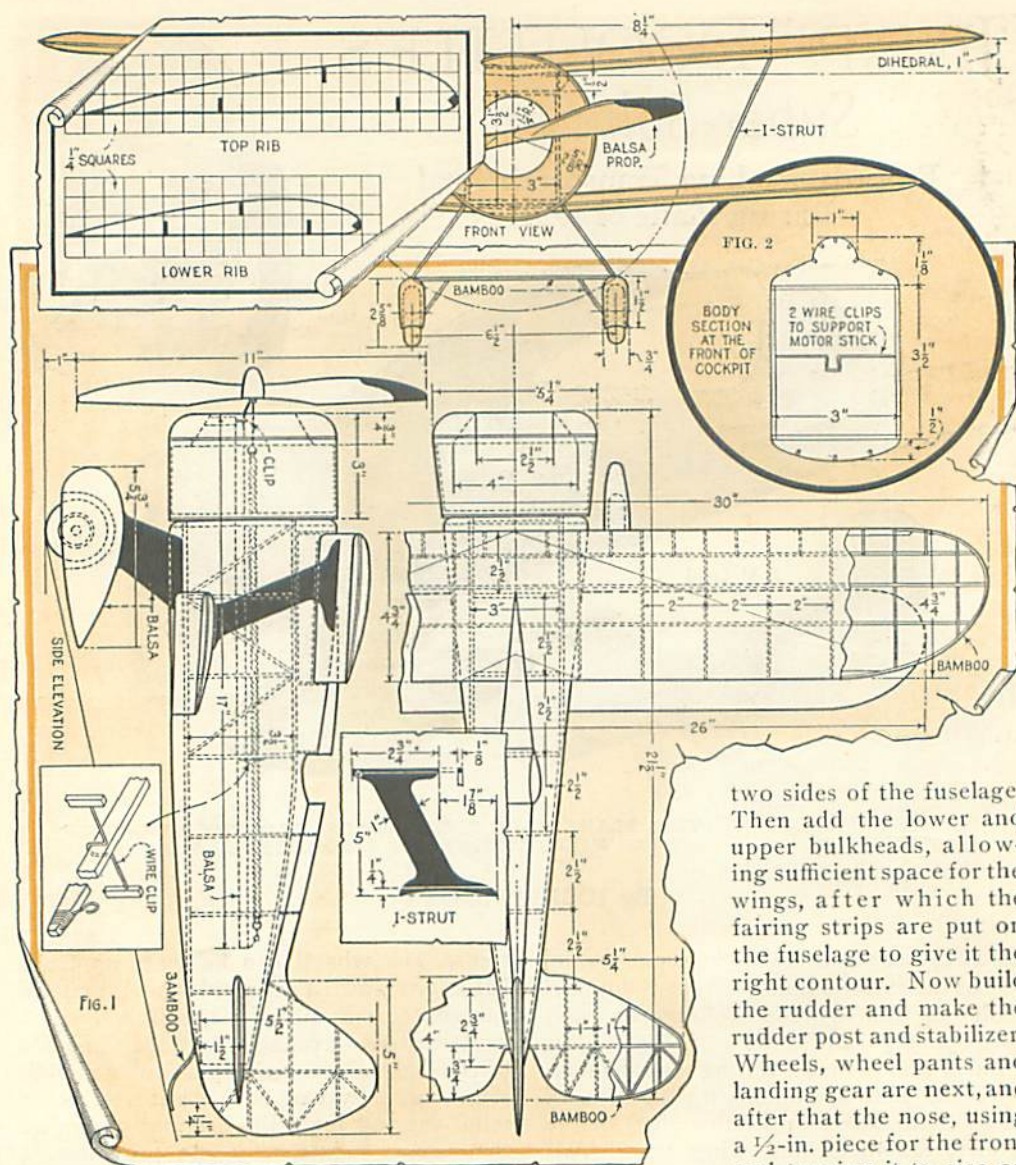
By JOSEPH S. OTT

BOYS, here is a real flying scale-model of the famous Laird "Super-Solution," made popular by the well-known pilot Maj. "Jimmy" Doolittle.

Balsa wood is used throughout the construction of this model, with addition of $\frac{1}{32}$ by $\frac{1}{16}$ -in. bamboo for the edges of the rudder, stabilizer and wing tips. This wood, weighing only 9 or 10 lb. per cubic foot, is best suited to model-airplane construction. For the longerons, uprights and crosspieces, you will need about ten lengths of $\frac{3}{32}$ by $\frac{5}{32}$ by 30-in. stock, while four pieces of $\frac{1}{2}$ by $2\frac{1}{2}$ by 30-in. material are used for the fairing, ribs, nose, cowl and wheel "pants." Three pieces of $\frac{1}{16}$ by $\frac{1}{16}$ by 30-in. balsa are required for the spars, a $\frac{1}{8}$ by $\frac{1}{8}$ by 30-in. length for the leading edge, and a $\frac{1}{16}$ by $\frac{3}{16}$ by 30-in. length for the trailing edge of the wings. Piano wire, about .031 in. in diameter, is needed for making clips and other fit-

tings. The wheels can be built up from balsa, or standard celluloid wheels may be substituted. Standard-size celluloid wheel pants are also available, but they are not of the right size for this particular model. However, they can be used if you don't mind varying from the original design of the "Super-Solution." The propeller is cut from a piece of $\frac{7}{8}$ by 1 by 11-in. stock, and about 20 ft. of $\frac{1}{32}$ by $\frac{1}{8}$ -in. rubber band is needed for the motor. I-struts and landing gear are made from $\frac{1}{8}$ by $2\frac{1}{2}$ by 30-in. stock. About five 20 by 24-in. sheets of tissue paper are required, besides model-airplane cement, wing dope and lacquer for painting exposed wood parts. The streamlined windshield is made from a sheet of thin celluloid.

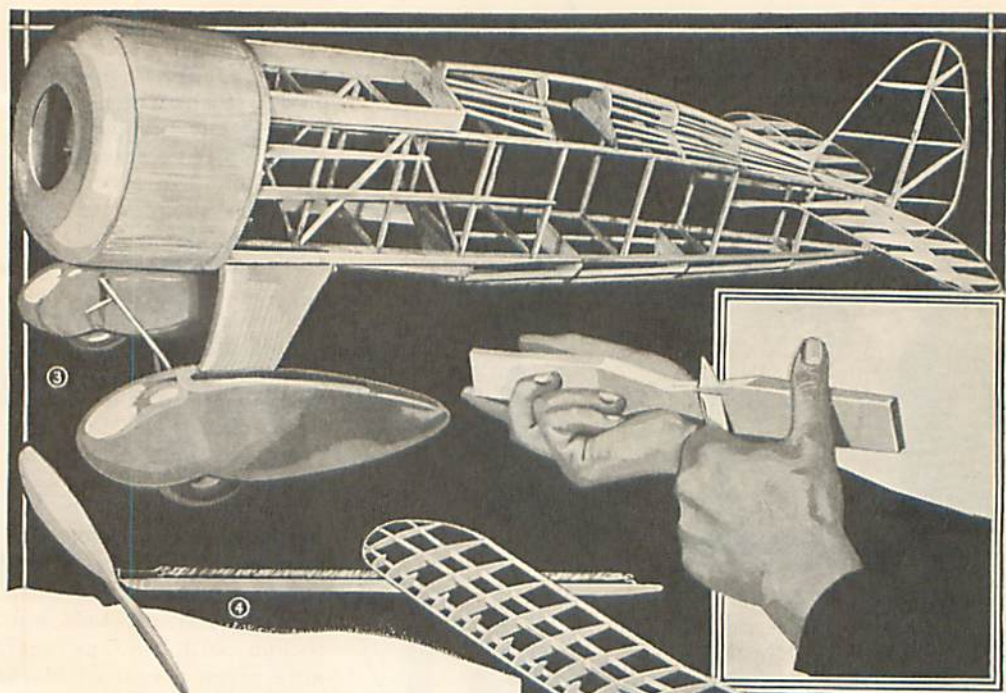
Fig. 1 gives the front, side and top views of the model, only half of the front and top being shown, as the other half has the same dimensions. In the upper-left de-



tail, both an upper and lower wing are shown with the three spars, the leading and trailing edges being indicated in black. The motor stick is supported by two clips set in the fuselage framing, as shown in Fig. 2 and in the lower-left detail. Although the dimensions given are for a 30-in. model having a body length of 22 in., the size may be increased proportionally, taking the exact ratio of increase into consideration when making every part.

The procedure in building the model is as follows: First build and assemble the

two sides of the fuselage. Then add the lower and upper bulkheads, allowing sufficient space for the wings, after which the fairing strips are put on the fuselage to give it the right contour. Now build the rudder and make the rudder post and stabilizer. Wheels, wheel pants and landing gear are next, and after that the nose, using a $\frac{1}{2}$ -in. piece for the front and turning it to size on a wood-turning lathe. The wings are then made and assembled, being careful to get a dihedral of 1 in., as shown in the front view in Fig. 1. This dihedral is necessary because of the large diameter of the nose, which is unusual for a flying model. Assemble the motor stick, Fig. 4, and add the wire parts. One clip for holding the motor stick is located at the front of the nose, while the other should be placed about two-thirds toward the rear. The propeller is carved as indicated in Fig. 6. Many details of the assembling can be obtained

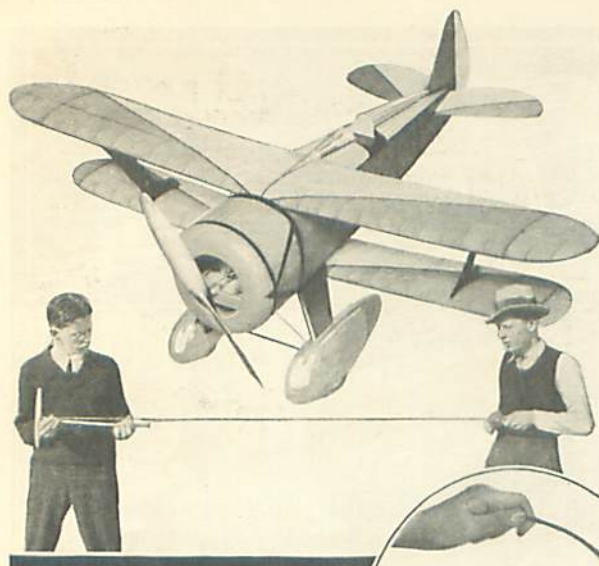


from Fig. 3, which shows the completed framework without the covering, while Fig. 5 shows one of the wings. As the I-struts, which are attached last, are set between the wings at an angle, as shown in the front view of the model in Fig. 1, their exact length is determined by measuring the distance between the upper and lower wing spars between which they are set. The dimension of 5 in., as given in the detail of Fig. 1, is therefore only approximate. When bending the bamboo, hold the piece on one side of a candle flame instead of over the flame as the latter method causes the wood to burn.

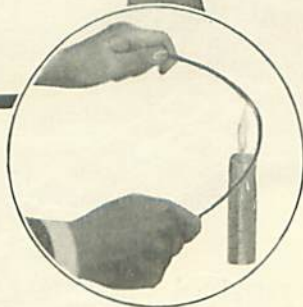
To overcome the resistance of the large nose, more rubber than is usually required on a model was found necessary for the motor, and the propeller in turn had to have a greater pitch than customary. The tail surfaces on a high-speed airplane are much smaller than those on a low-speed type. When reducing a speed ship to scale, the tail surfaces of the model must be made smaller than is consistent with flying stability, and therefore it is necessary to slightly increase the dimensions of the rudder and the stabilizer, but not so much that the proportions are exaggerated beyond a point wherein the model loses



its resemblance. The weight is concentrated in the wheel pants in order to obtain a low center of gravity which tends to bring the model out of a stall by causing it to dive rather than come back into a tail slide. The angle of incidence, or the angle at which the underside of each wing is inclined upward from a horizontal plane



at the front end, should be such that there is a difference of not more than $\frac{1}{8}$ in. between the leading and trailing edges if the weight of the model is kept down to $2\frac{3}{4}$ oz. If the weight of the completed model, ready to fly, reaches 4 oz., the angle of incidence should be increased to $\frac{3}{16}$ in., measured at the leading edge. Although the length of the motor stick is given as 17 in., your particular model might require a little shorter or



longer one, depending upon the balance of the completed plane. When flying the model, it should not rise rapidly, but gradually, and should level off when reaching a height of about 50 ft.

In the original model made for this article, the wings and stabilizer were covered with white and green tissue paper, overlapping $\frac{1}{8}$ in. at a diagonal line on the upper side, as indicated in one of the photos. Green paper was used to cover the sides of the fuselage and half of the rudder, while the white paper was employed for the top and bottom of the fuselage and the remaining half of the rudder. I-struts, tail skid, cockpit and landing gear were given a coat of black lacquer, while the wheels, wheel pants, nose and cowl-

ing were lacquered red. The propeller was coated with fine aluminum paint and the edges were trimmed in red. Likewise all adjoining edges of the tissue paper were decorated with a neat black line, the whole scheme helping to improve the appearance.

How to Make Tools for Cutting Linoleum Printing Blocks

For cutting linoleum, you will need a few tools, such as gouges, gravers, a burnisher and a sharp penknife. They should be about $3\frac{1}{2}$ in. long, including the handle, which can be made from a wood ball, about 3 in. in diameter, with one side planed flat. Steel umbrella ribs make good gouges and three-cornered files good line gravers. Fit the metal into the handles before sharpening it. A good burnisher can be made from a butter knife. The handle is cut off, leaving just enough to enable attachment of a wooden handle. The burnisher is used for detailed work and to strengthen the color locally. A good tool for fine-line work can be made from a bodkin, or large blunt needle, ground off

across the eye so as to make short prongs. This is fitted into a handle and is sharpened like the other tools.

Painting Outboard Propellers Red



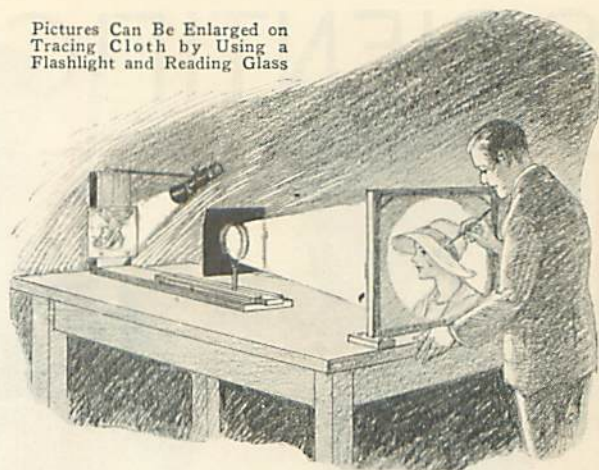
Application of a coat of bright-red paint to your outboard propeller will make it more easily distinguishable if lost in deep water. Tests

have shown that a propeller so painted can be detected at a much greater depth than it would be if left its original color.

Mending Cracks in Stoves

Cracks in the iron casing of a stove can be mended by filling them with stove putty or iron cement which can be made by mixing iron filings and water glass, using enough of the filings to form a thick paste. Force the paste well into the crack with a trowel or old table knife, and plaster over the surface of the crack with the same material. The heat from the stove will harden the cement and make a tight joint. Another iron mender is made of filings, flowers of sulphur and water, mixed to a stiff paste and applied to the crack in the same manner. This mixture burns when heated and turns into iron sulphide, which fuses and welds into one mass with the iron of the stove. Smoothing and polishing the repair will make the crack unnoticeable.

Pictures Can Be Enlarged on Tracing Cloth by Using a Flashlight and Reading Glass

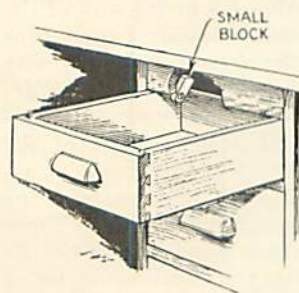


Pictures Enlarged with Reading Glass and Pocket Flashlight

All the apparatus you need for enlarging a small picture is a flashlight and a reading glass, besides, of course, a frame to hold a piece of tracing cloth or paper. The flashlight is held at an angle above and in front of the picture to be enlarged, the latter being set vertically on a support at the end of a table, as shown. The reading glass is placed between the picture and the tracing cloth on which the picture is to be projected. A sheet of heavy paper, preferably black, is cut out to fit the circumference of the glass to exclude undesired light. The center of the glass should be in a direct line from the center of the picture to the center of the tracing cloth. By moving the glass back and forth, you will be able to obtain an enlargement on the cloth in sharp focus.

Block Forms Effective Drawer Stop

Pivoted to the top edge of a drawer at the rear end, as shown in the drawing, a small block makes an effective stop to prevent a drawer from being pulled out inadvertently. If the drawer must be removed for cleaning, the block is pulled forward and down so that it will not strike against the crosspiece of the desk. It is, of course, advisable to use a hardwood block instead of soft wood, as the latter is likely to split.



String Removes Paraffin Top from Jelly Glass

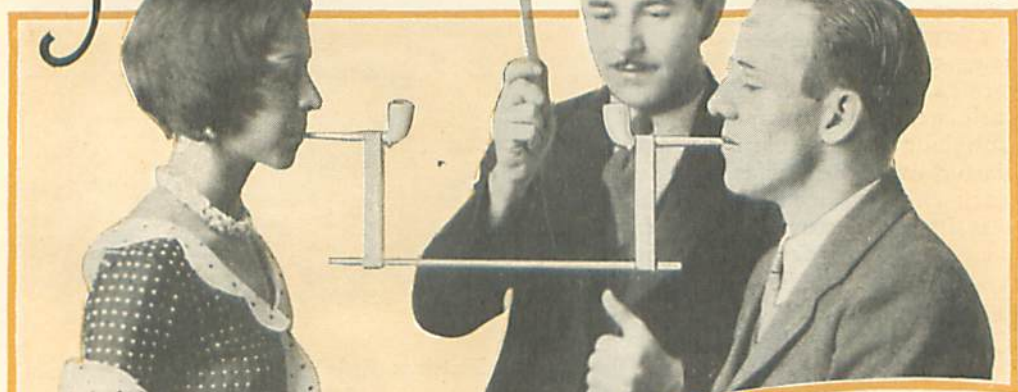
Paraffin seals on jelly glasses can easily be removed if a string is laid across the top of the glass when pouring the melted wax at the time of canning. When the jelly is to be used, the paraffin can be lifted off by simply pulling up on the ends of the string.—F. Mix, Chicago.

Paper Strip on Watch Crystal Checks Developing Time

As a time indicator for developing photos, you can use a small strip of gummed paper pasted to your watch crystal. By turning the crystal, the strip can be adjusted in any position across the dial to indicate a predetermined time limit. As soon as the large hand reaches the strip, you will know that the specified time for development has elapsed.



SCIENTIFIC FUN



By SAM BROWN

LOOKING at the picture above, you might draw any one of a dozen conclusions. As a matter of fact, however, the blow, which the performer is about to deliver, will break the stick completely in half as though it were made of glass, without injuring any of the other accessories or inconveniencing the assistants in any way whatever. The whole thing depends upon having everything exactly equal. The center of the stick must be previously measured, the stick must extend the same distance through each paper

band, and the paper bands must be the same length. The assistants must be of the same height and must be told on no account to flinch or move when the blow is being delivered. Needless to say, the biggest part of the feat is to find the assistants. You can have them hold the pipes in their hands instead of between their teeth in order to show that the experiment is harmless if correctly accomplished.

Here's one in muscular vibration: Take a door key and place it across the palm of your hand, as shown in Fig. 3. Note that the hand is slightly cupped and that the heavy end of the key projects beyond the palm. Now, if you open your hand very slowly, the key will magically turn over. The gradual stretching of the hand and

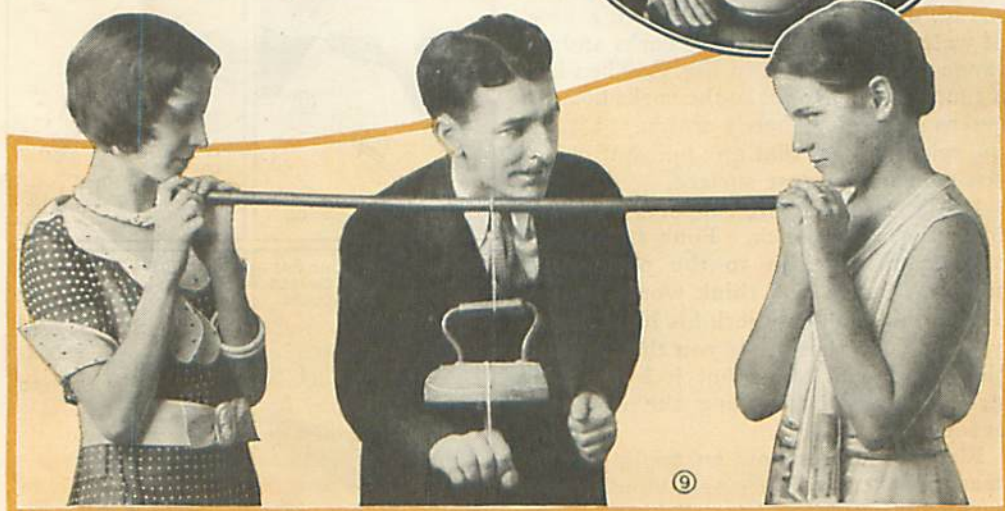
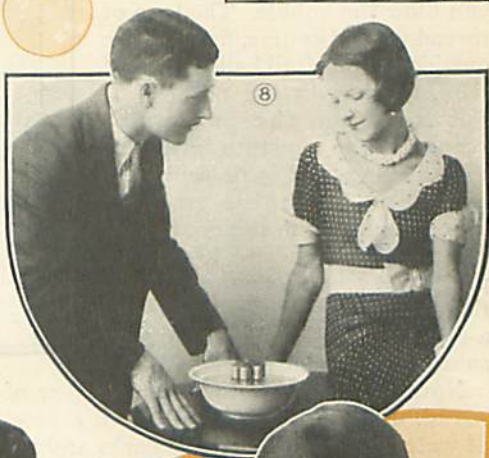


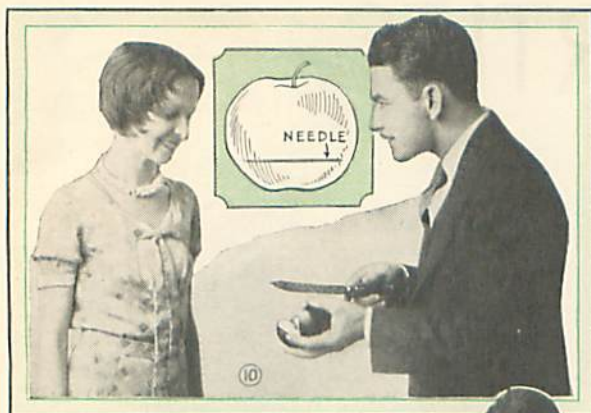
for your PARTIES

arm muscles cannot be detected if done slowly, and the consequent flip-flop is really mystifying even to yourself.

In the next one, you are handed a slip of crepe paper. This slip is about 6 in. long and has been cut almost in two at two places as in Fig. 5. The question is, can you pull the ends of the paper apart to liberate the center section? Maybe you'll figure "gently does it" or go in for a sudden snap. In either case only one of the tears will break, leaving the center section attached to the other end. How to do it? Simply prepare a second strip by fastening a coin to the center, concealing this weight with a small bit of the same paper. Doing the stunt with the slip so prepared, you will find that a quick jerk liberates the center section as in Fig. 4. It will be best to do the stunt over a chair cushion if you don't want a telltale thud to boom through the room.

You're taking a chance in having your sanity questioned when you ask the assembled crowd if anyone can punch a hole in a soap bubble without bursting it. "Really, old fellow, you must be joshing us. How could anyone penetrate the thin





film of a soap bubble?" But it's really easy. Make a tiny loop in a piece of silk thread. You loop this thread over the bubble pipe so that it hangs down over the bowl for about two inches. Then you blow the bubble. The loop of thread will, of course, float on the outside of your frail balloon. And then, quick with the needle. If this is red-hot, the point will evaporate the moisture inside the thread loop as in Fig. 6. And there you are! The bubble gradually grows smaller, the imprisoned air escaping through the hole. In passing, it might be as well to say that a teaspoonful of glycerin and a pinch of gum arabic in the soap solution will help considerably.

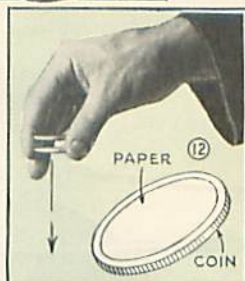
Now ask some one to float a number of round, untapered corks on end in a bowl of water. Take six or more corks and arrange them as shown in Fig. 7. Then it is a simple matter to make the corks float on end as in Fig. 8. There's nothing to it but the scientific fact that any buoyant object floats on its greatest surface.

In Fig. 9, one string supports a flatiron from the round stick. Four strings extend from the iron to the performer's hand. What do you think would happen if he would suddenly jerk his hand downward? Your sense tells you that the single strand will break, but it is the four strands that part, leaving the iron suspended.

Fig. 10 pictures how an apple may be neatly divided with a single blow from a heavy knife. Like the well-known golf-

ball-off-your-nose, the heft of the knife and the power of the blow depend largely on how much you value your hand, and, for that matter, the hand need not be used, especially when practicing how to perform this trick. Properly performed, however, the needle will stop any blow, allowing both halves of the apple to fall to the floor.

A paper disk is naturally much lighter than a similar-sized coin. When both are dropped simultaneously from the same height, under normal conditions, the coin will reach the floor before the fluttering paper, but it's easy to make the paper hit the floor first. Take two half dollars and cut a disk of paper slightly smaller. Hold the two coins between the thumb and forefinger of your right hand with the paper disk on top of the lower coin, about 3 ft. above the floor as shown in Fig. 12. Now, drop the bottom coin. The coin makes a half-revolution, so that if it was face up at the start, it will land

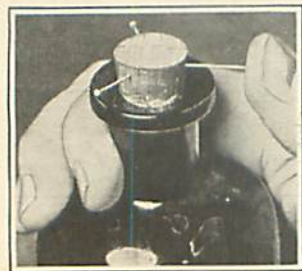


face down. The paper rides right along, and although it was on top at the start, it will be on the bottom at the end of the flight, and thus actually hits the floor before the coin, as illustrated in Fig. 11.

Lifting a plate with a bottle becomes a simple matter if you take advantage of the fact that air expands when heated and contracts when cooled. Heating the air in the bottle over a candle flame, shown in Fig. 13, causes the air to expand, forcing out the surplus. If the mouth of the bottle is then pressed firmly against a plate and held there, after the edge of the bottle has been coated with vaseline to make an air-tight seal, the cooling air will contract, causing a partial vacuum within the glass. The plate can then be lifted, as shown in Fig. 14.

In Fig. 15, we have a jar filled with water. Within the jar is a block of wood, held at mid-depth by a piece of thread which has been attached to the lid of the container. If you wanted to break that thread, would you give the jar a quick jerk downward, or would you give it a quick push upward? Are you surprised to learn that the quick jerk upward has the better chance of breaking the cord?

Poison Bottles Identified with Pins



Bottles containing poisons can be marked distinctly for identification by pushing three pins into the cork as shown. This method is

especially valuable because it prevents mistakes in the dark. Although other means can be used, pins are available at all times, so there is no excuse for leaving a poison bottle unmarked.

Guide for Tearing Heavy Paper from the Roll

Heavy paper, such as the kind used in building construction, can be quickly torn from the roll in straight strips by using the illustrated guide, which consists of a

Guide for Tearing Rolled Paper Can Be Improvised from Yardstick and Rubber Bands



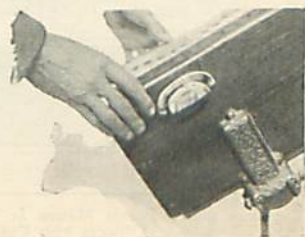
yardstick and a few rubber bands. The roll is suspended between two rests in the regular way, and a heavy rubber band is slipped over each end of the shaft and over the end of a yardstick, which is placed against the roll of paper as shown. If the paper is wider than 36 in., a longer straightedge should be substituted for the yardstick. In use, the paper is unrolled and torn off along the guide.

Turning a Canoe in Strong Wind

Those having difficulty in turning a canoe in a strong wind will find the following method helpful: If you are in a bathing suit, sit at the stern as usual and trail your foot in the water on the side to which you wish to turn, leaning the body to the same side and paddling on the opposite side. If you cannot use your foot, sit in the middle of the canoe and lean in the direction of the turn, paddling on the opposite side.

Drawer Pulls Help to Open Large Dictionary Stand

Large dictionaries are easy to open if metal drawer pulls are screwed to the wooden leaves of the holder as shown. Besides making it convenient to use, these grips help prevent wear on the book, as without them, a person usually presses the leaves and covers to open it.





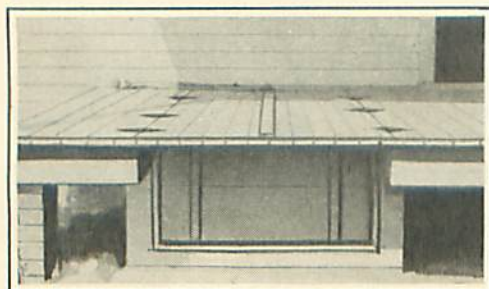
Photographing Images of Yourself or Your Friends, Reflected on Bright Headlight, Gives Unusual and Grotesque Effects

Comic Photos Taken on Headlight

Unusual photos can be produced by photographing grotesque reflections on a highly polished headlight. For close-up work of this kind, it is, of course, necessary to use a portrait-lens attachment on your camera in order to obtain sharp definition. The finished print is cut down so that it shows only the subject photographed, as in the lower detail, instead of the entire lamp as shown above. Enlargements can also be made.

Basement-Entrance Door Forms Part of Porch Floor

Especially designed to move large and heavy objects into a cellar, the entrance shown has a door that forms part of the porch floor. The end of the entrance also opens so that heavy objects can be let



Entrance under Porch Makes It Easy to Let Heavy Objects into Cellar

down with little effort. Besides its feature of utility, such a door is almost unnoticeable.

String Keeps Ice-Box Drain Clean

A length of rough string or cord hung in an ice-box drain pipe, will keep the pipe free from scum, which will collect on the string instead of on the pipe. The string should be replaced with a clean one at regular intervals. If one end of it is weighted, it will be easier to get it into the pipe.

Brace to Hold Young Tree Straight

Stakes should never be driven close to young trees to hold them straight. It is much better to drive the stake into the ground several inches away and wrap a piece of inner tube around the tree. Then support the tree with a cord or rope incased in a section of an old hose, draw up the ends of the cord to the stake and tie them securely. This method prevents chafing of the tree trunk when the wind is blowing.



Long-Lived Soap Bubbles

Soap bubbles, which will last for hours, and will not burst when they come in contact with damp cloth or dry wool, may be blown if a small amount of glycerine is added to the soap solution. An effective solution for blowing permanent bubbles is made by dissolving $\frac{1}{2}$ oz. of castile soap in $6\frac{1}{2}$ oz. of distilled water to which 4 oz. of glycerine is added, after which the solution is thoroughly mixed. Bubbles blown onto a dry wool cloth and protected from heat and evaporation by a cover glass will frequently hold their shape for several days.



SHOP NOTES

A SOLDERING IRON for Every Purpose

By C.A. Crowley

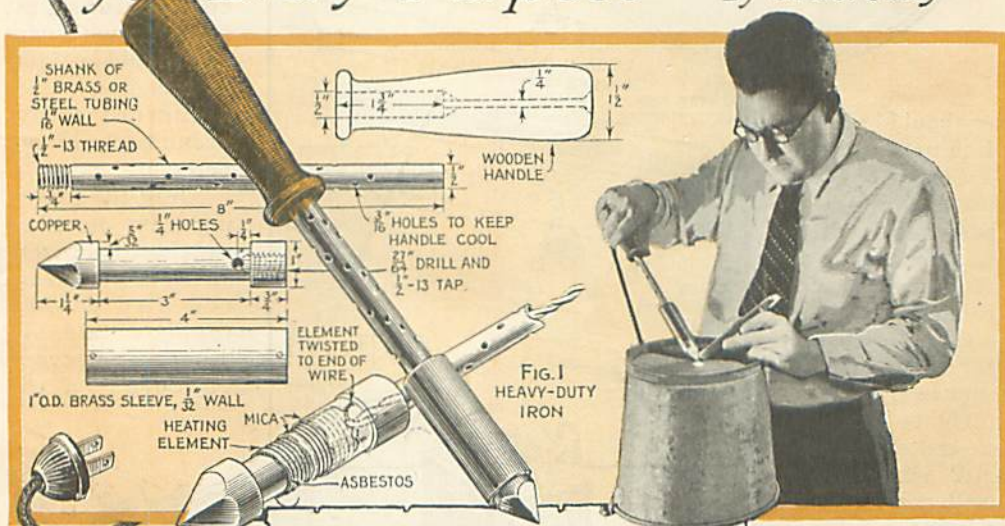


FIG. 1
HEAVY-DUTY
IRON

FOR less than \$2 you can make a set of high-grade electric soldering irons, to operate on either 110 or 32-volt supply. You can also make a small iron that operates on a storage battery for use around the car where an electric outlet is not at hand.

First turn the handle in the lathe and drill it lengthwise for the cord and shank. For heavy-duty and medium-size irons, follow the constructional details of Fig. 1. To keep the handle cool, $\frac{3}{16}$ -in. holes, spaced $\frac{3}{4}$ in. apart, are drilled through the shank, which is rotated 45° between drillings. The bit is a length of copper rod with a recess turned in it to receive the wind-

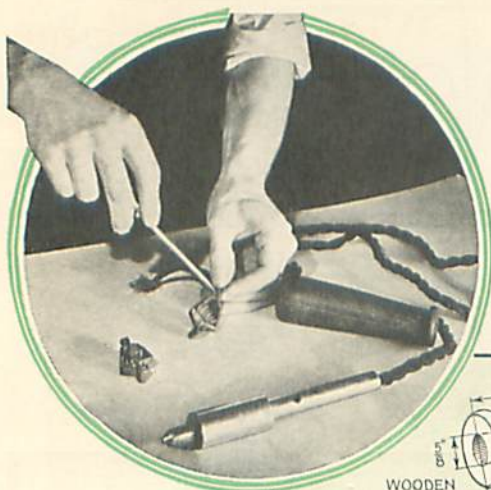
RESISTANCE-WIRE DATA FOR SOLDERING IRON
(NICHROME OR CHROMEL WIRE ONLY)

SUPPLY	TYPE OF WIRE	WIRE LENGTH	WIRE SIZE
110 V.	225 WATT, HEAVY DUTY	21 $\frac{1}{2}$ FT.	No. 25
	150 " MEDIUM	20 FT.	No. 28
	85 " LIGHT	23 $\frac{1}{2}$ FT.	No. 30
32 V.	225 WATT, HEAVY DUTY	8 $\frac{3}{4}$ FT.	No. 19
	150 " MEDIUM	6 FT. 10 IN.	No. 22
	85 " LIGHT	5 $\frac{1}{2}$ FT.	No. 25
6 V.	85 WATT, LIGHT	16 IN.	No. 18

ing. A hole is drilled and tapped at one end for the shank, which is threaded to fit, and there is a $\frac{1}{4}$ -in. hole directly through the end of the tapped hole for

the heater-cord wires. The table gives the sizes and lengths of wire to use. Do not substitute other wire than nichrome or chromel, as it may vary considerably in resistance value.

Before winding the element, screw the shank into the bit, and pull the ends of a 7-ft. length of heavy-duty, asbestos-covered heater cord through the lead holes in the bit. In fishing these wires through the holes, avoid damaging the asbestos covering, and for this reason, the cotton wrap-



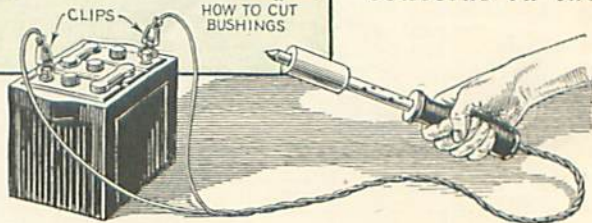
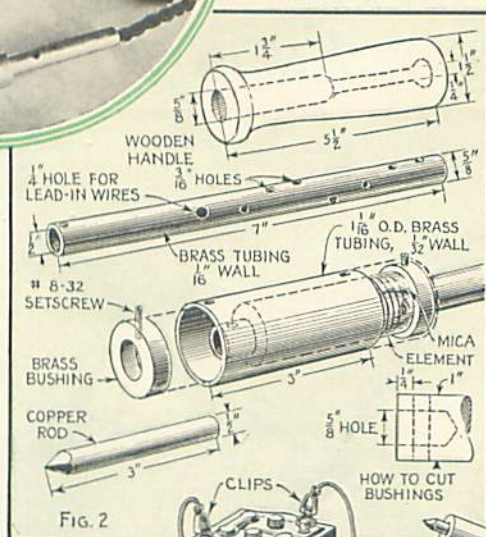
per should be left in place until the ends of the wire are bared. A piece of sheet asbestos is then moistened so that it can be formed around the curved recess of the bit. One end of the resistance wire is securely twisted to one end of the cord and, allowing a small space between turns, the resistance wire is carefully wound over the asbestos. When you reach the end of the recess, slip a piece of thin mica over the first layer and continue winding toward the other end over the mica, which is used between successive windings so that no two turns of the resistance wire are touching each other. Also be sure to keep the bared ends of the resistance and heater-cord wires from touching the bit, as this will cause a short circuit. When the winding is finished, the end of the resistance wire is twisted to the other bared end of the cord, after which a brass sleeve is slipped over the bit and held in place with setscrews. The handle slips over the cord and onto the shank.

Light-duty irons are made by following the same general procedure with slight changes. Fig. 2 shows details of construction. In this case, the shank is not

tapped to fit into the bit, but the bit slips into the end of the shank, and the element is wound directly on the latter, using asbestos and mica for insulation as already described. The sleeve, which is slipped over the element, fits on brass bushings drilled to fit the shank. The sleeve, bushings and bit are then securely held in position on the shank with setscrews. The 6-volt iron is made up in the same way. Spring battery clips on the ends of No. 10 heavy-duty, asbestos-covered heater cord

enable quick attachment to the storage battery. All connections must be made with care and should be tight, as this iron passes a current of approximately 15 amperes.

All of the soldering irons described can be built from standard-size brass rod and tubing, readily obtainable. There are several concerns in the



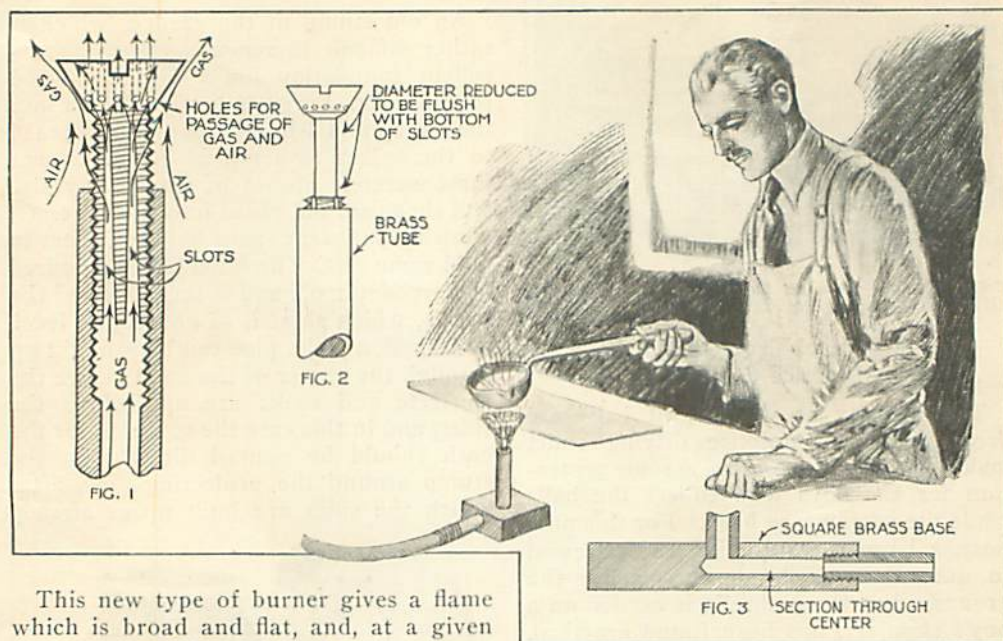
larger cities who will gladly send out these materials in any quantity as you want.

Horn on Tractor-Drawn Binder

Mounting an auto horn of the "squawk" type near the seat of the operator on a wheat binder, corn cutter, or any other farm implement that makes much noise and is drawn by a tractor, has saved much unnecessary shouting which, furthermore, the operator cannot always hear.

By placing a layer of small stones in front of your basement windows, you will prevent mud from splashing on them during rainy weather.

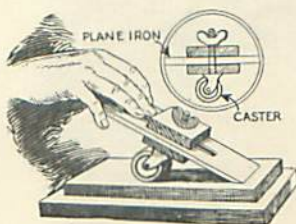
This Gas Burner Gives a Wide, Even Flame



This new type of burner gives a flame which is broad and flat, and, at a given distance from the tip, is of uniform temperature. It consists essentially of a metal tube, provided with a modified machine screw. The tube is threaded to receive the screw, and the screw has slots filed along it parallel to its axis. A number of small holes are drilled through its head in the same direction as the slots. The altered screw is shown in Fig. 1, which also indicates the operation of the burner. The slots are filed slightly deeper than the cut of the threads, and are deeper and larger at the end of the screw farthest from the head. Four slots at equal distances around the circumference of the screw will give very satisfactory results. The holes in the head of the screw permit the passage of gas and air to the center of the flame, and the natural flare of the screw head causes part of the gas and air to be thrown outward. It is this feature that is not found in most burners, and which is the cause of the broad, uniform flame. The gas passes by the screw through the slots filed along it, and the size of the flame may be easily controlled by turning the screw in or out of the threaded tube. As the slots are deepest at the lower end of the screw, the largest quantity of gas will flow when the screw is farthest out

of the tube. Air is mixed with the gas as the latter flows up the exposed portion of the screw, which, by virtue of its threads, sets up miniature eddies in the gas stream. Within reasonable limits, the size of the apparatus does not matter. However, a most useful size is that employing a U. S. standard No. 14-20 flat-head iron machine screw, and a tube of suitable material to fit. A still broader flame may be obtained by cutting away the screw threads for about $\frac{3}{8}$ in. just under the head, as shown in Fig. 2.—W. E. Stewart, Sewaren, N. J.

Caster Helps Sharpen Plane Iron



correct angle when sharpening it on an oilstone. The caster also allows free movement of the iron over the stone, and the edge can be honed at a uniform bevel.

Mounted on a caster by means of two blocks and a wingnut, the illustrated arrangement holds a plane iron at the



Collecting Golf Balls on Practice Court with Long-Handled Dipper, under Protection of Large Parasol

Large Parasol Protects Workers on Practice Golf Court

The velocity at which golf balls are driven across a practice driving court makes it advisable to provide some protection for the boys who collect the balls while the patrons are busy. For this purpose, a large parasol, with a skirt sewed to one edge which almost reaches the ground when the umbrella is carried on a boy's shoulder, has been found practical. Working with their backs to the golfers, the boys pick up the balls with a long-handled dipper.

How to Solder Cast Iron

Ordinary cast iron can be soldered by first giving it a coating of copper. To do this, cover the surface with blue vitriol, after which a flux consisting of zinc dissolved in muriatic acid is applied. Solder will then adhere to the iron.

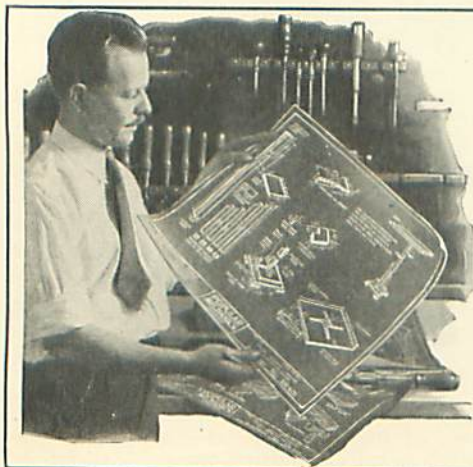
Bird Bath and Rock Garden Built around Old Stump

An old stump in the garden, which is rather difficult to remove, makes an excellent foundation for a bird bath and rock garden. Large spikes are driven into the stump and 1-in. wire mesh is fastened to the spikes to serve as reinforcement for concrete. Stones of almost any size and shape are imbedded into the concrete, allowing sufficient space between them to hold some dirt. The bowl may be poured in a wooden mold and is set on top of the stump, which should, of course, be level. If desired, a $\frac{1}{2}$ -in. pipe can be brought up through the center of the bowl before the concrete and rocks are applied to the sides, and in this case the concrete for the bath should be poured directly on the stump around the projecting pipe, after which the sides are built up as already



Unightly Stump on the Lawn Serves as Base for Rock Garden and Bird Bath

mentioned. It is a good idea to provide a small cock in the pipe so that the water supply can be regulated.



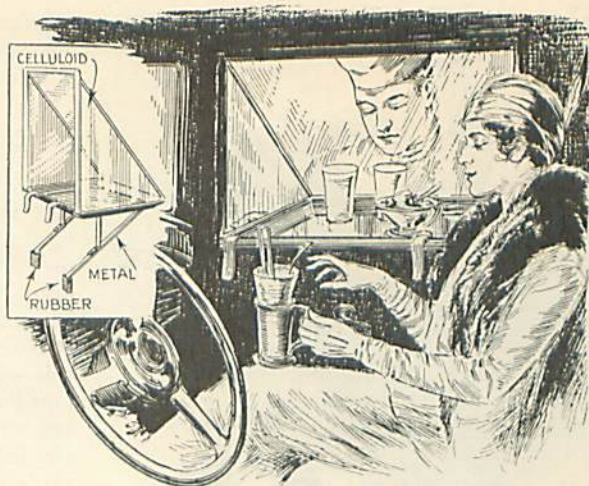
300 BLUEPRINTS for Home Craftsmen

Popular Mechanics offers large blueprints covering subjects of all kinds that are of interest to craftsmen. A sample and complete list of prints will be sent to anyone upon receipt of 6c to cover mailing costs. Prices of prints are 25c each, six for \$1, or a collection of thirty-five for \$5 postpaid.

Address Blueprint Dept.

Preventing Oats or Barley Smut by Formaldehyde Treatment

According to reports from the agricultural college of Nebraska, one of the most practical methods of treating oats or barley to prevent smut, is to spray or sprinkle them with a solution consisting of formaldehyde, 1 pt., and water, 10 gal., for every 40 bu. of grain, although the exact proportions of formaldehyde and water are not vitally important. The sprinkling can be done by one man, while another scoops the grain from the bin into the wagon. This is usually done late in the evening and the grain is then covered overnight with a tarpaulin or blanket, so that it is ready for seeding the next morning. Only the amount to be sowed should be prepared the previous evening.



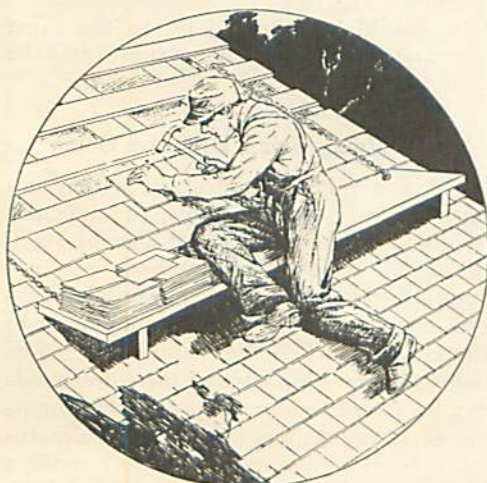
Fitting Closely around Auto Window, Celluloid Hood Keeps Rain or Dust Out of Roadside-Stand Serving Tray

Celluloid Hoods on Serving Trays for Roadside Stands

Owners of roadside stands, who use serving trays that hook over the edge of the car doors, will find that they can provide an added comfort for the patron by attaching a celluloid hood over the tray, which keeps out cold drafts and rain. The hood may be made removable so that the tray can be used with or without it. The panes of celluloid can be either sewed together at the edges on a wire frame or they may be tacked to a wooden frame held securely to the tray by thumbscrews.

Plank on Triangular Supports Holds Shingles When Covering Roof

Provided with two wedge-shaped supports nailed to the underside of a plank, as shown, it is easy for the worker to keep a bunch of shingles at hand. A length of chain is fastened to each end of the plank and a hook at the end of the lengths fastens to the sheathing of the unfinished portion of the roof.—C. E. Jacobs, Laredo, Mo.



Both Worker and Material Conveniently Supported on a Plank Fastened to the Roof with Chains

Big Hitches Make Easy Driving

Contrary to the usual idea, a big team hitch as worked out by the Horse Association of America makes it easier for a man to drive a team, increases the amount of work that a horse can do, eliminates side draft, enables one to work closer to fences, and makes it easier to handle unruly horses than when the same number of horses are worked by two or more men in smaller teams. Working teams in tandem on a plow eliminates side draft, and a five-horse hitch with three horses ahead and two behind, gives the rear team more air space and enables the driver to have full view of every horse in the hitch.

☛ A rubber bath sponge removes lint and dust from wool clothing.



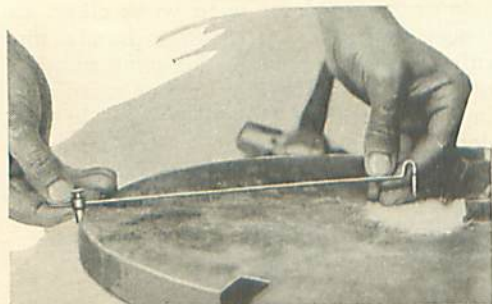
Book Shelf Mounted on Chassis of Discarded Wheel Chair Makes Portable Library for Hospital

Hospital Has Library on Wheels

This portable library consists of a book shelf mounted on wheels, from which patients in a Philadelphia hospital can choose their favorite reading matter. The frame and wheels from a discarded invalid chair can be used for this purpose.

Substitute for Hermaphrodite Calipers

In the absence of a large pair of hermaphrodite calipers, a substitute can be improvised from a length of rather heavy wire and a radio binding post. One end of the wire is bent over and filed to a point to serve as a center and the binding post is slipped over the other end. In use, the sharp end serves as a center and the binding post as a contact for checking the cir-



Length of Wire and Binding Post Form Useful Substitute for Large Hermaphrodite Calipers

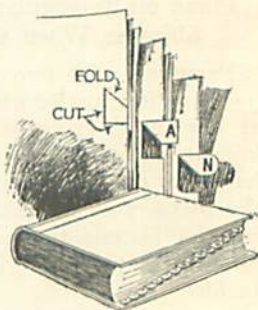
cumference of castings, or the binding post can be used as the center and the pointed end as a scribe.

Toy Balloons Effective in Scaring Birds from Fruit Trees

A western orchard owner uses inflated toy balloons in his fruit trees to keep away the birds. The wind keeps the bright-colored toys in constant motion, which proves highly effective for the purpose. It is only necessary to protect the fruit in this way while it is ripening, and the balloons will usually last a few weeks. They are not inflated to the full extent, as the air inside expands when heated by the sun's rays, which will cause bursting.

Quickly Formed Index Tabs

When you desire some index tabs in a notebook, simply cut into the edge of the leaf as shown and fold it to project over the edge of the page at the point indicated by the dotted line. The size of the tab can, of course, be varied to suit the purpose or the lettering it is to carry. After folding, the tab can be pasted where doubled although that is not essential. All the tabs should be trimmed off to the same size and, if desired, the corners may be rounded.



Identifying Small Drills by Color

When a regular drill stand with numbered holes is not available, the difficulty of quickly determining the size of small drills on which the numbers are not stamped can be avoided by applying several bands of paint of different colors to the central part of the drill shanks. The color sequence and size of the paint bands can be varied to obtain an unlimited number of combinations. In using this method, it is, of course, necessary to provide a key chart, which carries a duplicate of the color system and also the drill sizes.

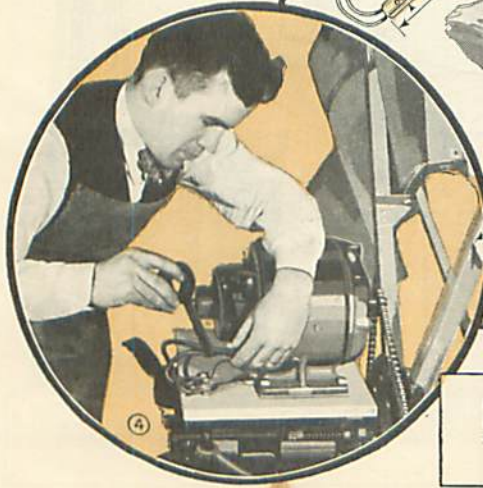
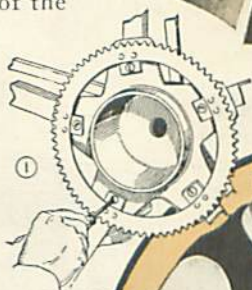
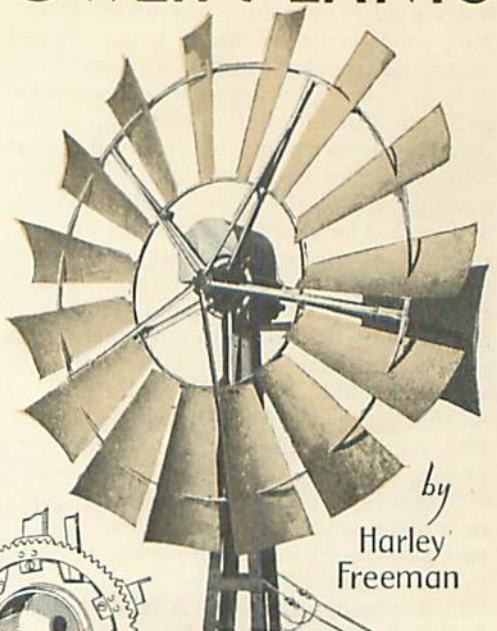
WIND-DRIVEN POWER PLANTS

You Can Build



DUTCH windmills have been making power for centuries, but the development of wind-driven giants for supplying electricity is comparatively recent. Despite their apparent weakness of failing to function in the absence of wind, large power plants driven by air have been found quite practical, and smaller units for the summer cottage or backwoods camp are easily constructed.

A typical small plant, capable of generating sufficient current to light several 32-volt lamps, is shown. The basis of the unit is an old 8-ft. windmill wheel, together with the vane and tower. These parts can usually be picked up in the country, as many wheels have been abandoned with the coming of electric-power lines. Construction work on the plant is commenced by fitting a large sprocket to the windmill wheel as in Fig. 1. The size of this sprocket will vary, but it must be sufficiently large to accommodate the gearing necessary to drive the generator at a suit-



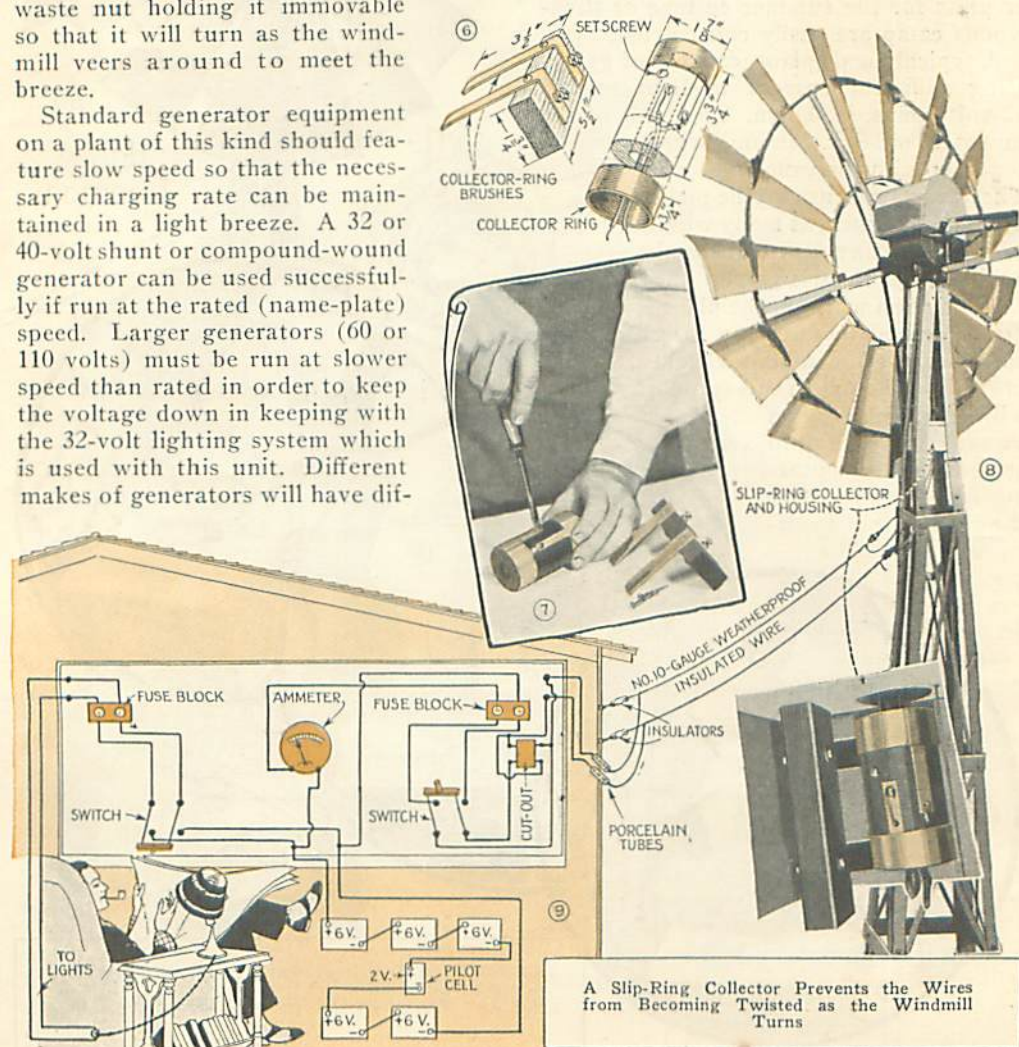
Constructional Details of Small Power Plant Which Charges Storage Batteries at the Rate of 10 to 15 Amp. in a Fair Breeze; an Old Windmill Wheel and Tower Are Used

able speed in a normal breeze. The one shown allows a take-off of 7 to 1. Fitting can usually be made through the same holes used in attaching the wheel to the hub, small pieces of metal being clipped under the sprocket to allow a clearance of at least $\frac{1}{2}$ in. In order to fit the generator in place, the internal mechanism of the original pump should be removed. This will usually leave a flat surface, over which a solid baseboard can be fitted, as shown in Fig. 2. The base can be fastened by one or more of the original bolts used in the pump. A section of pipe, shown in Fig. 3, takes the place of the original pump shaft and is housed in the same manner. This pipe is an actual part of the turntable, the waste nut holding it immovable so that it will turn as the windmill veers around to meet the breeze.

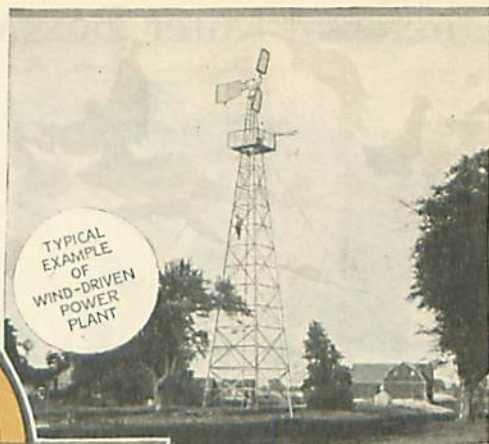
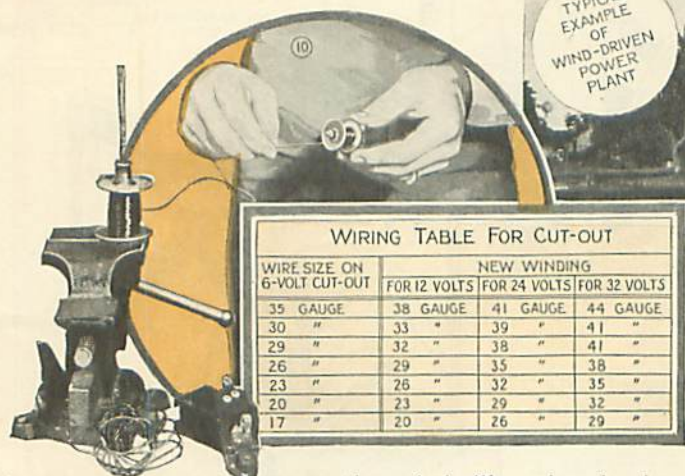
Standard generator equipment on a plant of this kind should feature slow speed so that the necessary charging rate can be maintained in a light breeze. A 32 or 40-volt shunt or compound-wound generator can be used successfully if run at the rated (name-plate) speed. Larger generators (60 or 110 volts) must be run at slower speed than rated in order to keep the voltage down in keeping with the 32-volt lighting system which is used with this unit. Different makes of generators will have dif-

ferent outputs at various speeds. For a typical example, a 1,750 r.p.m. generator, producing 110 volts at full speed, will deliver 65 volts when run at 1,200. In every case, the generator speed must be governed through the take-off on the sprockets so that, figuring the wheel will turn 150 r.p.m. in a fair breeze, the generator will build up to the required number of revolutions to produce the 40 volts necessary for a standard 32-volt lighting system, and this at a charging rate of from 10 to 18 amperes.

The generator shown in Fig. 4 is a 40-volt unit, and the take-off on the sprocket of 7 to 1 will bring it to full speed (1,050 r.p.m.) in an average breeze. A



suitable cover, as in Fig. 5, must be provided in every case, in order to keep the generator out of the weather, and a wick-oiling system must be fitted to keep the chain in good condition without the need of constant attention. It is quite evident that a collector ring will be necessary to prevent the wires from becoming twisted



TYPICAL
EXAMPLE
OF
WIND-DRIVEN
POWER
PLANT

becomes evident that a considerable saving can be effected by making one. This can be readily made from any automobile cut-out, but care must be exercised to get the ampere turns and

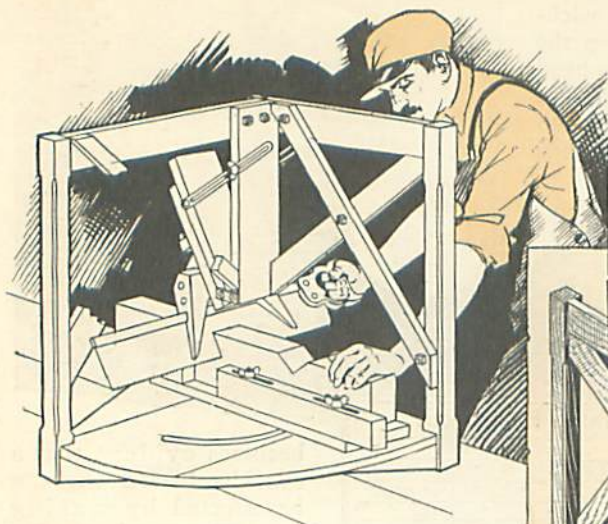
as the windmill swings around. This can take the shape of the simple unit shown in Figs. 6 and 9. The wooden cylinder pictured in Fig. 7, is bored from end to end to fit snugly over the lower end of the pipe shown in Fig. 3. The wires running through this pipe are carried up through small holes drilled through the wood to connect to the contact plates provided, as in Fig. 6. The lower photo shows the slip-ring collector in place, a small wooden box protecting it from the weather. No. 10 gauge weather-proof wire should be used for the power lines. Heavy porcelain insulators should be properly fitted at either end of the line. After taking the power line into the house, the hookup will be somewhat after the arrangement shown in Fig. 9. The batteries used can be either a bank of regulation automobile type or one or two larger units to provide the 32 volts necessary. A pilot cell should be provided so that the condition of the battery or batteries can be easily checked. In order to prevent the generator from being run as a motor when the output falls below 32 volts, it will be necessary to fit a cut-out for the required voltage. Since a new cut-out of this capacity will cost several dollars, it

wire size in exact proportions. Start by removing the heavy outer wire from the automobile cut-out, then remove the fine inner wire, counting each turn as you take it off. For the sake of illustration, we will say that the 6-volt automobile cut-out has 100 turns of fine wire. Now, for a 12-volt cut-out, it will be necessary to use twice the number of turns; for a 24-volt cut-out, four times the number of turns; for a 32-volt cut-out, five and one-third the number of turns. In this particular case ($5\frac{1}{3}$ by 100) the fine wiring will have 533 turns. The gauge of the wire must also be changed, as shown in Fig. 14. For example, if the original fine wire of the automobile cut-out measures 35-gauge, the new wire for the 32-volt cut-out must be 44-gauge. The heavy outer wiring is rewound without any change.

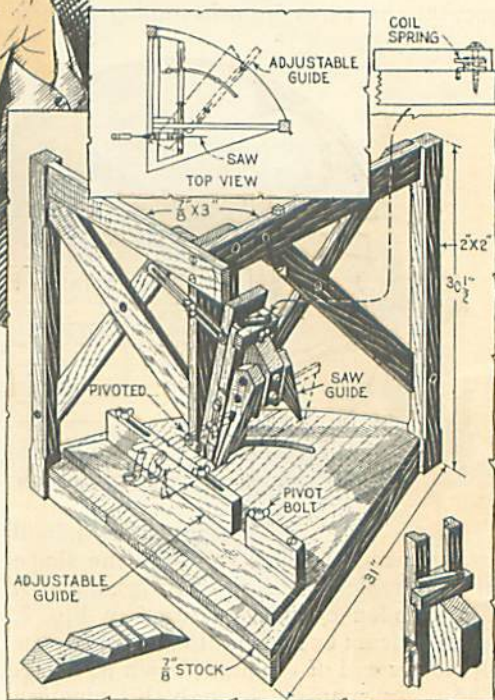
Destroying Poultry Lice

Poultry lice of all types may be killed by sprinkling the entire inside of the chicken house, including nests, with a mixture consisting of equal volumes of crude carbolic acid and water. Sprinkle first the upper parts of the house, the walls, nests and roosts, and finally the floors.

Universal Miter Box Makes Compound Cuts



Sturdy in Construction, This Miter Box Is Quite Unusual, As It Can Make a Compound Miter without Blocking Up the Work

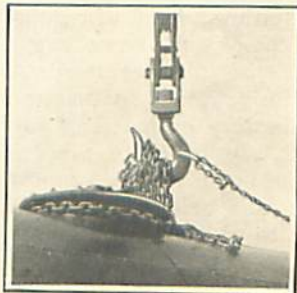


Different from the usual type of miter box in that two miters can be cut at the same time, this box is both novel and useful. The advantage lies in the fact that the work need not be blocked up to make a cut at an angle to the top surface. This is done by adjusting the saw holder. Also, instead of turning the saw to any point of rotation on a horizontal plane, which is the method followed in most homemade and manufactured miter boxes, this one differs in that the holder for the work swings around at any angle within the limits of 45° , to accomplish the same result. Another feature that is convenient is the small coil spring and stop, which holds the saw above the work when not in use. This item is shown in the upper and lower right-hand details. By carefully studying the drawing, you can readily determine how this miter box works and how it is constructed. Variations leading to improvements are, of course, possible. —S. P. Furman, Miami, Fla.

other blade from catching in the work. Although this arrangement will slightly retard the cutting speed, it prevents broken teeth and makes each stroke of the saw equally effective.

Light Chain Serves as Tag Line

A length of light, strong chain, welded to the hook of fall blocks or derricks, makes a good tag line. The chain will not fray and is much stronger than the rope customarily used for this purpose so that risk of accidents is reduced.



Double Hacksaw Blades for Sawing Small Tubing

Two blades placed in a hacksaw frame so that the teeth of each point in opposite directions will prevent jumping when cutting small tubing or other thin metal. The teeth of one blade tend to ride over the metal and thus prevent the teeth of the

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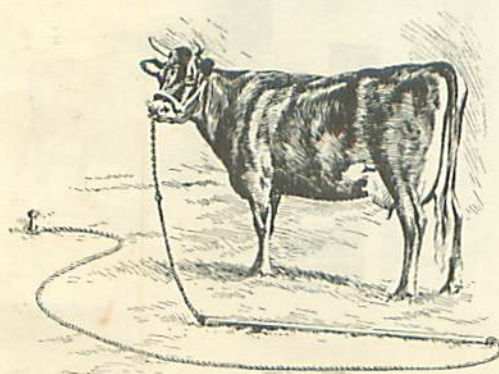
MISSING

21. It is constructed of soft wood with nailed butt joints. The lid is pivoted instead of being hinged so that, when open, it tilts back slightly and the mirror is usable. A glass bottom is set into a groove as shown in the detail. The frame of the lid is made of solid walnut, and the panel, which has the inlay pasted to it, is set in a deep groove as shown. The box proper is covered with flexible wood, the material starting from the inner edge of the bottom and extending over the outside and top edge, and about 1 in. inside of the box. A joint is formed at each corner, as it would be impossible to bend the material around a right angle against the grain. These joints can be accurately cut by allowing the material to extend past the corners until it is fastened down all around. Then, by setting the box on edge, the ends are trimmed with a razor blade held flat against the box. The material is mitered at the top and bottom edges.

Kits containing various kinds of flexible wood for use in making several items are obtainable from the manufacturer. Use of the special adhesive is advisable for hanging flexible wood on walls but is unnecessary for the smaller articles.

Pole on Tether Prevents Tangling

To prevent animals from getting tangled in the tether rope, attach a ring to each end of a light pole a little longer than the animal to be tethered. Slip the rope through the rings and tie it in place so that there will be just enough rope between the halter and the pole to prevent the animal from lifting it off the ground.



Light Pole Tied in Tether Rope Keeps Animal from Entangling Its Legs

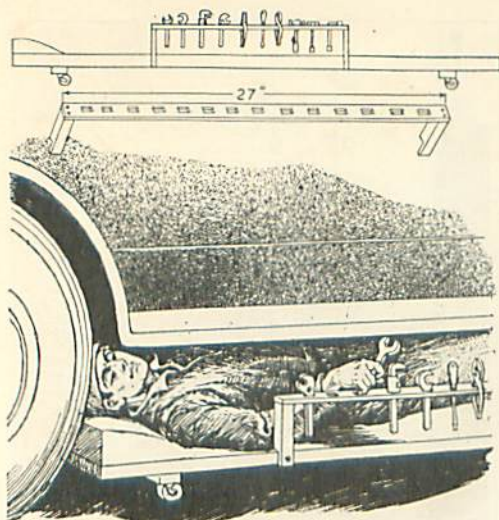


Milling-Machine Attachment Holds Work at an Angle

This milling attachment holds the work at any angle. It consists of a 24-in. length of 3-in. tubing, held by two steel supports, milled to fit the bed of the machine and bolted to it. The end through which the tubing is inserted, is cut through on the underside and is made thin enough so that it will grip or release the tube on a $\frac{3}{4}$ -in. stud screwed in each arm. Two faceplates or bars are shaped to slip over the tube and tightened by means of a setscrew in each. Five $\frac{1}{4}$ -in. holes are then tapped in the face of these bars, for studs which hold a clamp made of $\frac{1}{4}$ by 1 by 3-in. steel, with a $\frac{1}{4}$ -in. projection at one end and the holding stud inserted through the other. The supports are adjustable lengthwise of the tubing, and the face bars are turned on the tube to secure proper slope on the work, or moved along the tube to adjust for length.

Efficient Paint and Varnish Drier

An efficient drier for paints and varnishes may be prepared by grinding together 4 parts of zinc oxide and 1 part of manganese borate. After these constituents have been reduced to a fine powder, add boiled linseed oil in just sufficient quantity to work into a thick viscous solution. Stir and add to paint.



Garage Creeper Has Tool Rack Screwed to Side for Convenience of Worker

Tool Rack Handy on Garage Creeper

Garage workers have found it handy to mount a tool rack on the side of their creeper as shown in the drawing. It consists of two uprights of wood or angle iron notched at one end to fit over the edge of the creeper and drilled for screws. The rail, screwed across the uprights, has a number of holes to fit various tools. The convenience of this rack lies in the fact that the tools are always within reach.—Albert J. Calandra, Gloversville, N. Y.

Inexpensive Tint Blocks for Printers

Tint blocks that can be had for practically nothing can be made by gluing No. 00 sandpaper, cut to the desired design, to a block of wood which is type-high, cutting off the projecting edges of the block to prevent contact when printing. It is also possible, of course, to use emery cloth or other material of a similar nature, in order to obtain various intensities of tint.—Floyd Sutton, Versailles, Missouri.

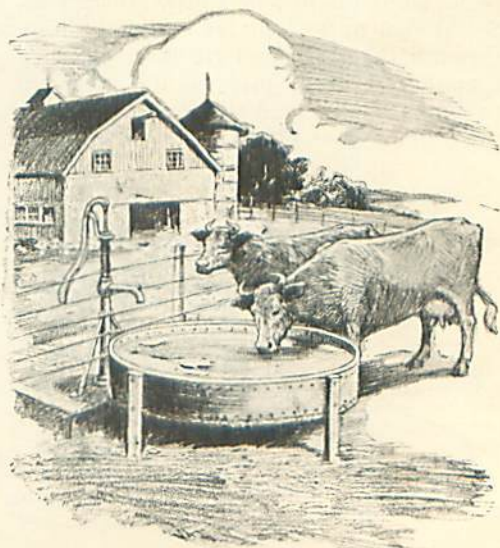
Circumference Divided in Lathe

Some pieces of work that ordinarily necessitate the use of a milling machine and a dividing head, can be done with equal accuracy and more speedily in a lathe. Where two shallow holes are to be drilled diametrically opposite, they can be laid out

as follows: Mount the work in a four-jaw chuck and select a length of rod that will fit between the lathe bed and one of the jaws. Then, holding the chuck stationary against the rod, scribe a mark on the work with the point held in the tool holder. Remove the rod, turn the chuck to the opposite jaw and repeat the operation, which will result in two marks 180° apart. If a three-jaw chuck is used, mark at the position of each jaw, then with the dividers locate a point midway between any two of them. This will be exactly opposite the remaining mark. Circumferences can be divided into any even number in the same way. The divisions can be made into odd numbers with the aid of a protractor head held in contact with any one of the chuck jaws, so that the attached level indicates when the desired degree of rotation has been reached.—L. D. Richards, Denver, Colo.

An Economical Stock-Watering Tank

Made from a discarded tractor wheel of large size, from which all the spokes have been removed, this watering trough has a concrete bottom and will last indefinitely. The best way to make the bottom is to place the wheel on a level floor with the rim propped up about ½ in. Heavy galvanized wires, stretched across the bottom, through the holes formerly occupied



Stock-Watering Trough Made from Large-Size Tractor Wheel by Providing a Reinforced Concrete Bottom

by the spokes, make a sturdy reinforcement. Cement is poured into the rim to a thickness of approximately 2 in., of which $\frac{1}{2}$ in. projects below the edge of the rim. An overflow pipe is set in place while the cement is still soft, and legs are bolted to the sides through holes previously used for lug bolts. All other holes in the rim can be closed with washers and bolts.

Quick Remedy for Saw That "Runs"

When a few teeth of a saw are set out a little more on one side than on the other, causing the saw to "run" slightly, place it on the bench with the defective side up and give one light stroke the entire length of the blade with an oilstone, which will usually prove to be an effective cure. Of course, a saw in bad condition cannot be made to function correctly by this treatment. If you have a saw with too much set, both sides may be dressed down in this way.—C. King, East Kingston, N. H.



One Light Stroke of Oilstone Usually Cures Slight Tendency of Saw to "Run"

Keeping Flies from Fresh Paint

When painting is done in the summer and trouble is experienced with flies and other insects alighting on the painted surface before it dries, add one or two teaspoonfuls of either oil of citronella or oil of wintergreen to each gallon of paint, stirring the oil into the paint thoroughly. The odor of these oils will keep the flies away, unless the wind blows them against the surface.

Considerable saving in household ammonia is effected by purchasing it in concentrated form and diluting it in the proportion of 1 part ammonia to 7 parts water.



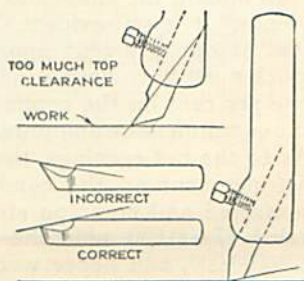
Steel Fencepost Puller Automatically Grips Post as Handle Is Moved Up and Down

Jack for Pulling Steel Fence Posts

Pivoted to a triangular base made of flat or angle iron, as shown, this fencepost puller is self-locking. A 10-in. link is pivoted to the end of the lever, two pins extending from the side of the link to grip the posts. The pins may be either welded to the link or may be short bolts, and are spaced just far enough apart to allow them to slip over the post when the link is held horizontally, but will securely grip it as soon as the link is forced up at an angle.—Luther Strosnider, Onaga, Kans.

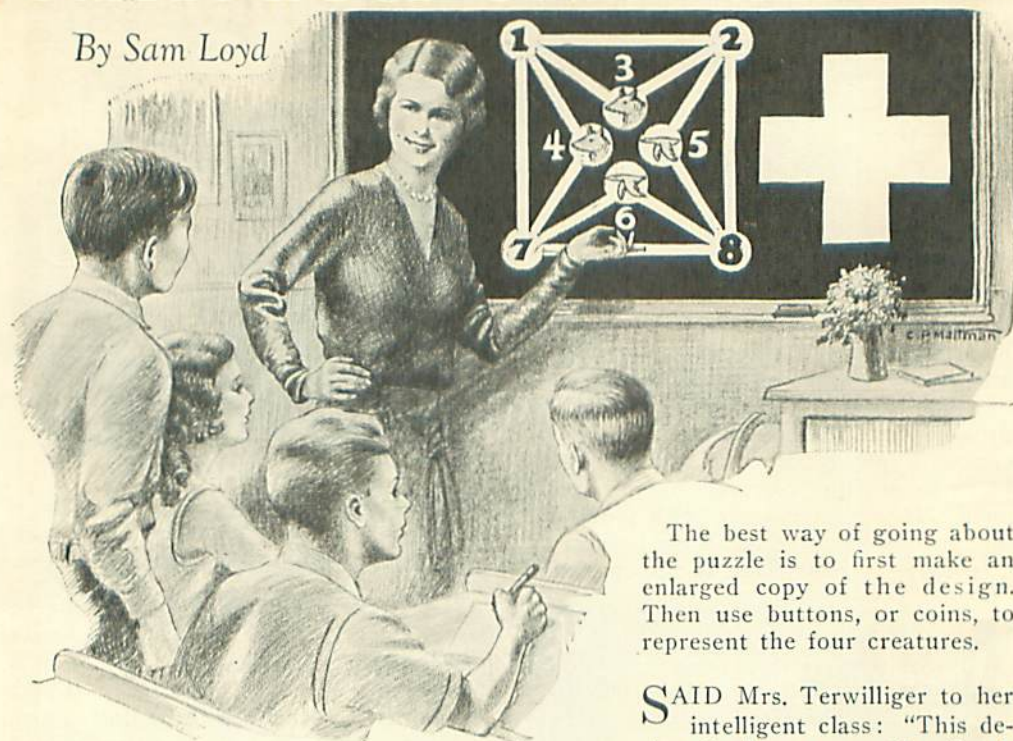
How to Grind Lathe Bits for Shaper Use

When lathe-tool bits are used in shapers, the cutting action is likely to be jumpy, unless the bits are properly ground for this use. A bit ground incorrectly digs into the work and chatters the surface, while one ground correctly, as shown in the lower detail, will cut smoothly and without chattering.—Cecil Jones, Mt. Vernon, Ohio.



Can You Solve *these* Puzzles?

By Sam Loyd



The best way of going about the puzzle is to first make an enlarged copy of the design. Then use buttons, or coins, to represent the four creatures.

"**H**ERE is a little puzzle-game to sharpen your wits," said Mrs. Terwilliger to her pupils:

"Moving in turn, a fox and then a goose, along the roads from one circle to another, and without ever putting two in the same circle at one time, in how few moves can their positions be reversed, so that the foxes shall occupy circles 5 and 6 and the geese 3 and 4?"

SAID Mrs. Terwilliger to her intelligent class: "This design is known as the Greek cross, its form being composed of five squares of one size. Now, if we assume that the figure is a piece of land, and has an area in square yards equal in number to the number of running feet around it, then how long would be the inclosing fence?" In other words, its perimeter is the same in number of feet as its area in number of square yards. What is the perimeter?

Answers to Last Month's Puzzles

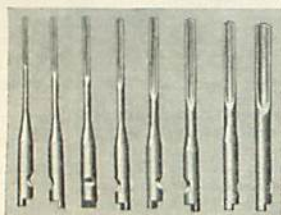
In finding the answer to "Puzzling Dividends," it is self-evident that three-quarters of one per cent upon the preferred stock must have been equal to one-half of one per cent on the common. Therefore, the common issue amounted to \$11,400,000. As to the net earnings, they amounted to $6\frac{1}{4}$ per cent on the combined issues of preferred and common stocks, which totaled \$7,600,000 plus the above sum or \$19,000,000, and hence were \$1,187,500.

To solve the "Puzzle in Horseflesh," let us set down the cost of keeping the horse as X dollars. Then Brown's investment would be 42 plus X dollars. On the sale he realized \$75. His loss was one-sixth of 42, or \$7, plus one-fifth of X dollars. From which we deduce the equation: $42 + X - 75$ equals $7 + X$ divided by 5. Solution gives, first, $4X = 200$, and thus the value of X is 50 dollars. His loss therefore amounted to \$17.

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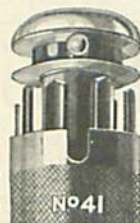


Photograph of "Yankee" individual test of drill-points... each and every one of the hundreds of thousands made for use in "Yankee" Push Drills and "Yankee" Spiral Drivers.



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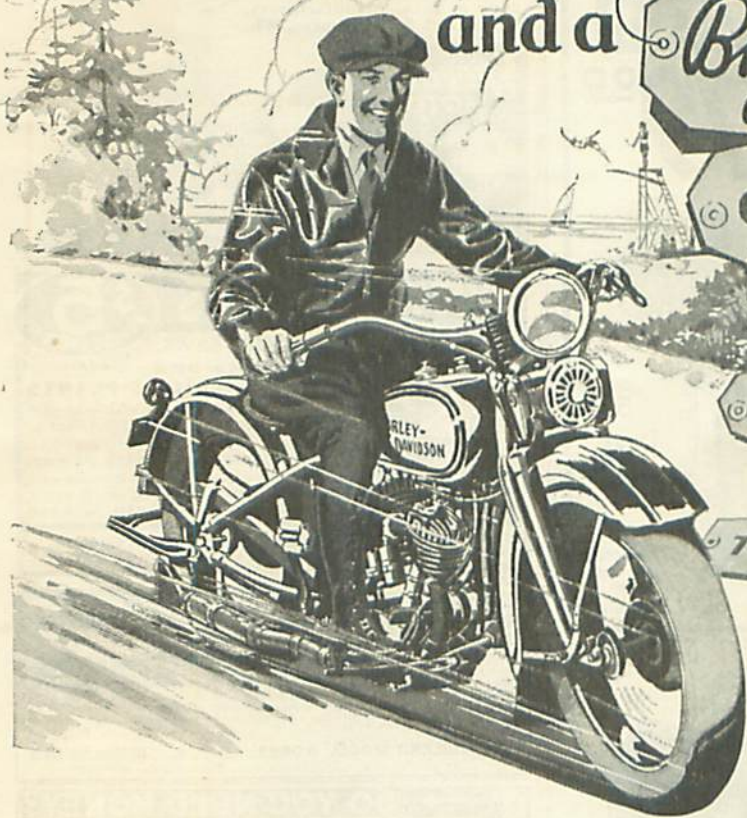
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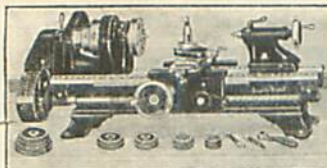
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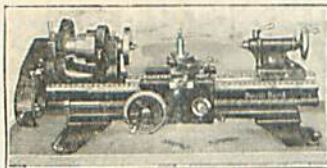
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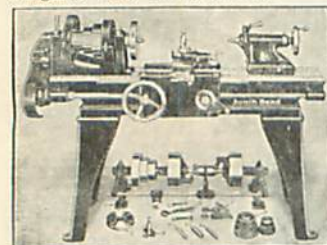
for Back-Geared Screw Cutting Lathes



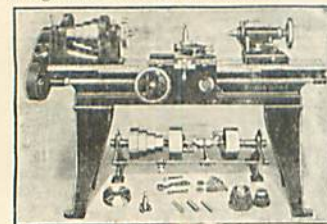
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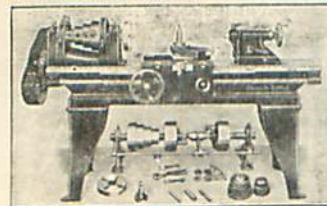
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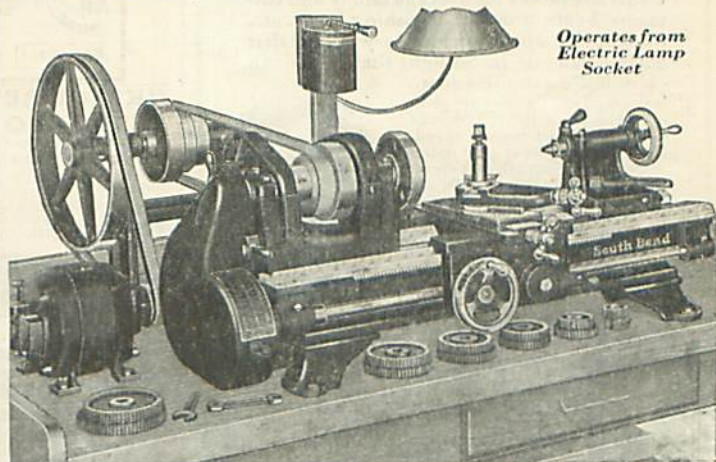


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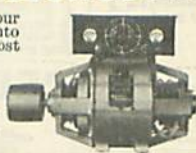
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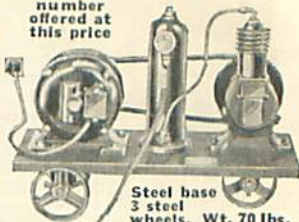
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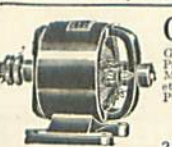
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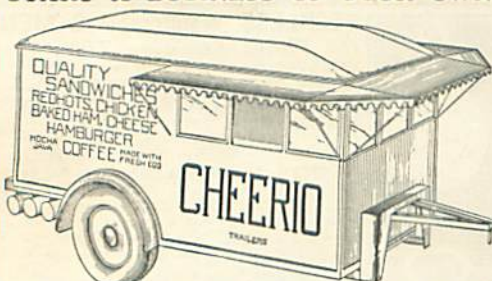


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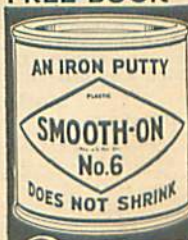


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